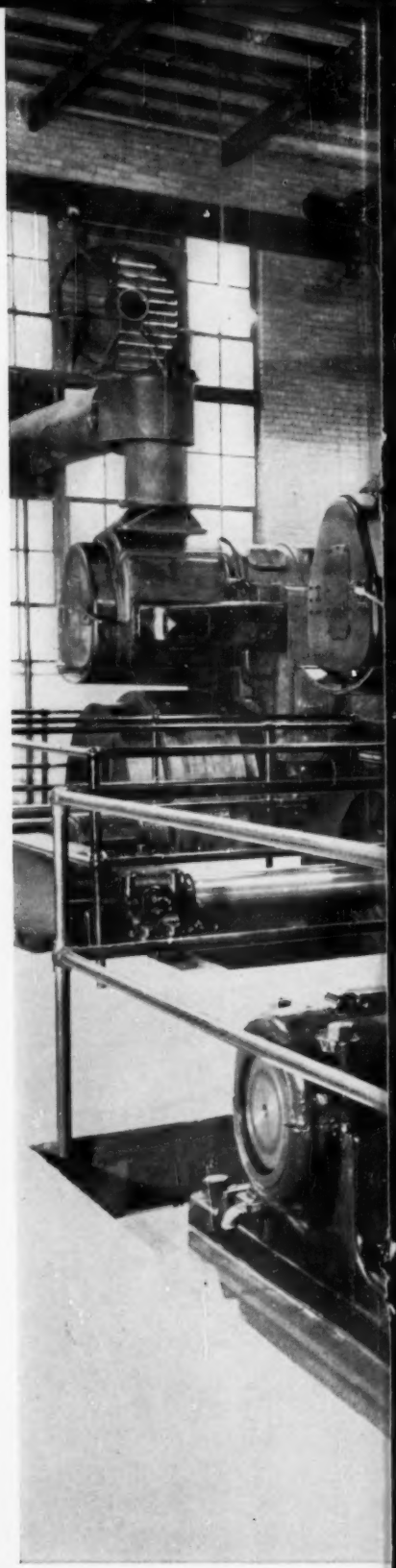
January 1957

diesel power

1956 1957

"Texaco Ursa Oil Heavy Duty is really doing a great job"

. . . reports Plant Superintendent



In this plant (name on request) all engines—three dual-fuel and two straight diesel—are lubricated with *Texaco Ursa Oil Heavy Duty*.

"A scheduled overhaul of one of our dual-fuel engines after 8,550 hours showed rings in excellent shape, wear on liners less than .0005 inch, no evidence of wear on bearings. Check-ups on our other units show substantially the same results."

Texaco Ursa Oil Heavy Duty is fully detergent and dispersive—with outstanding ability to inhibit oxidation, prevent rust and bearing corrosion, stand up under high temperature and pressure, minimize wear. It is one of the complete line of famous *Texaco Ursa Oils*—all designed to make diesel, gas and dual-fuel engines deliver *more power* with *less fuel* over *longer periods* between overhauls.

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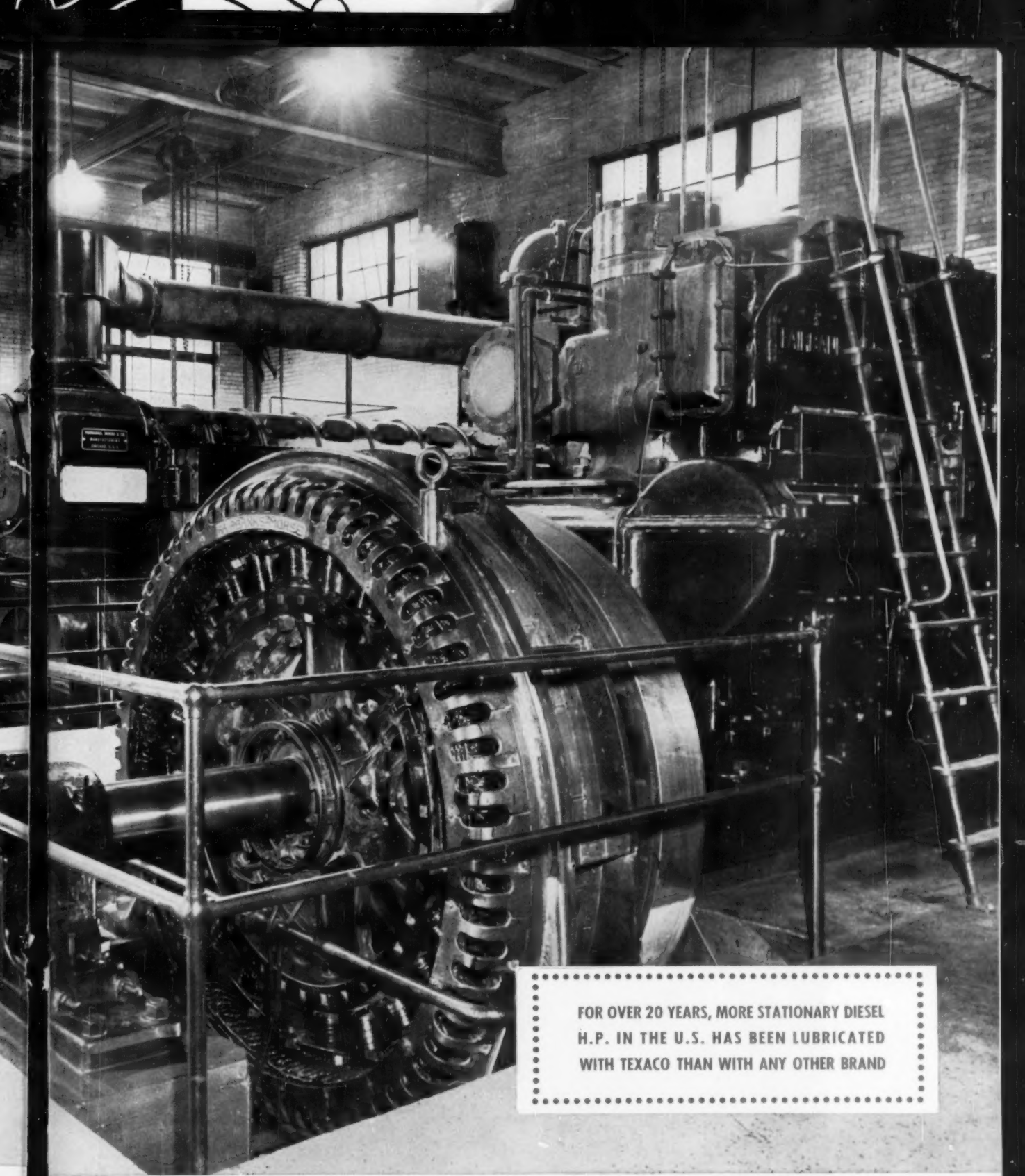
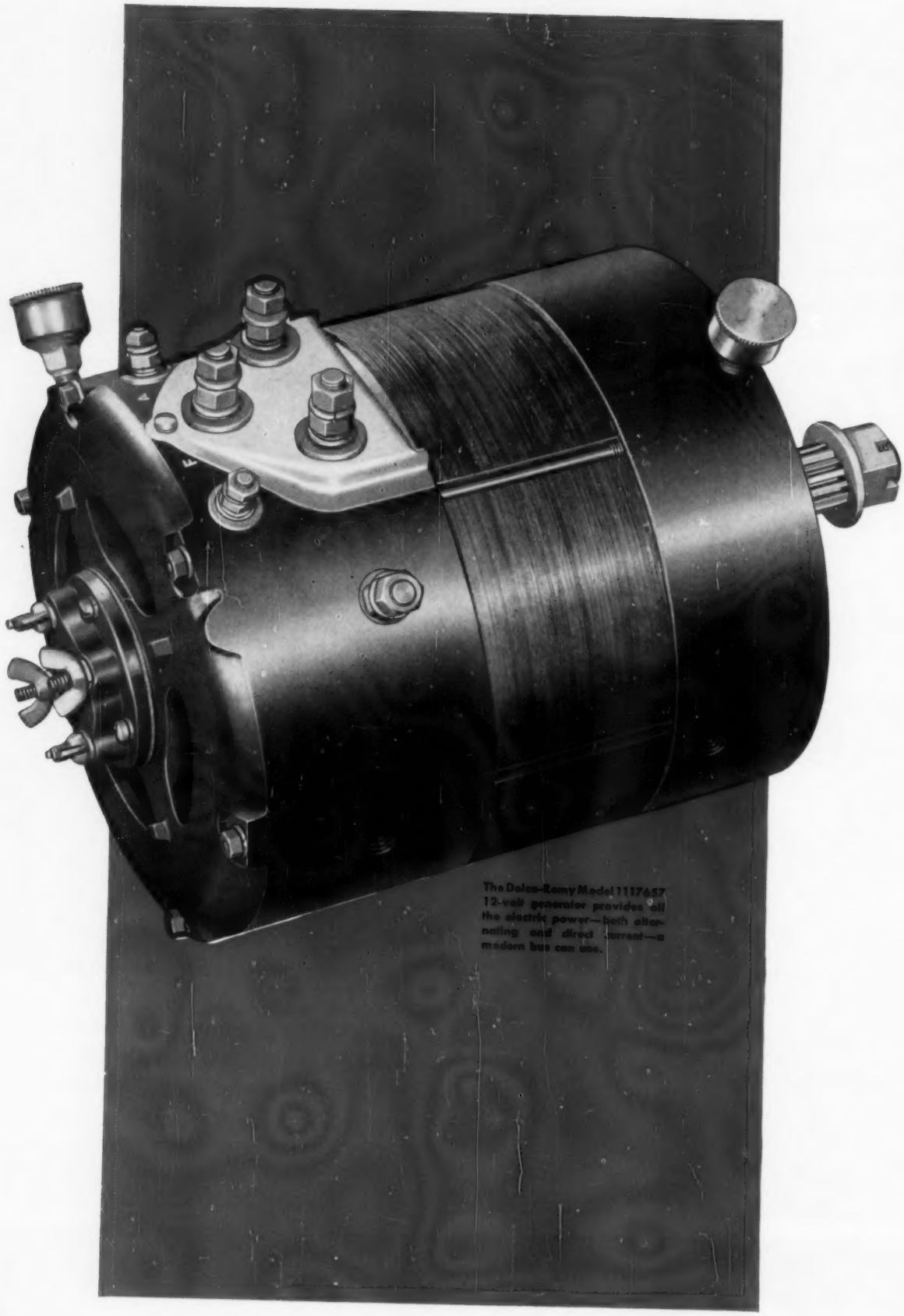


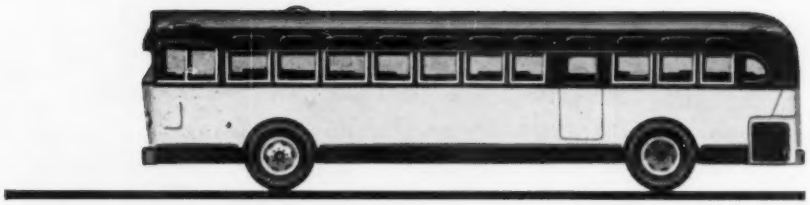
FOR OVER 20 YEARS, MORE STATIONARY DIESEL H.P. IN THE U.S. HAS BEEN LUBRICATED WITH TEXACO THAN WITH ANY OTHER BRAND

URSA OILS

FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES



The Delco-Remy Model 1117657 12-volt generator provides all the electric power—both alternating and direct current—a modern bus can use.



ASK FOR DELCO-REMY MODEL 1117657—THE GENERATOR THAT HANDLES THE TOUGH JOBS WITH EASE!

This Delco-Remy 12-volt generator—Model 1117657—is the heart of an A.C.-D.C. charging system designed specifically for buses with continuous and extremely heavy electrical loads. It has a low cut-in speed of about 550 rpm, a curb-idle output of 130 amp., and a maximum output of 180 amp. at approximately 2000 rpm. Physically, it is rugged yet extremely low in weight for such a tremendous output. With its matching regulator and rectifier, Model 1117657 will give you all the power a modern bus can use—alternating current for fluorescent lighting, plenty of direct current for other electrical equipment. Specify Delco-Remy A.C.-D.C. charging systems for your buses. They're typical of Delco-Remy leadership in the automotive electrical field.

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diesel power

Established in 1923 **Vol. 35, No. 1** **January, 1957**

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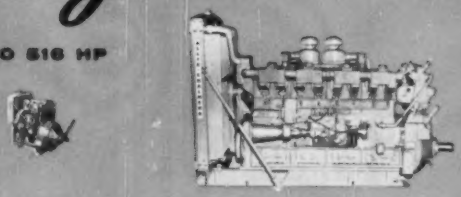

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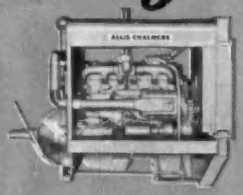

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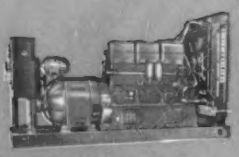
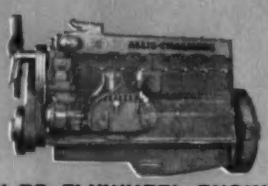


GENERATOR SETS



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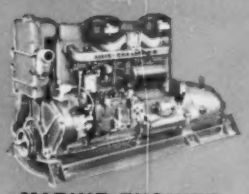

MARINE ENGINES

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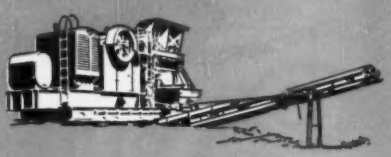

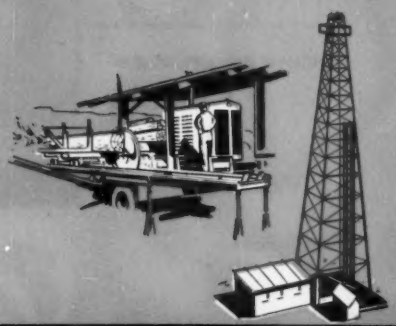

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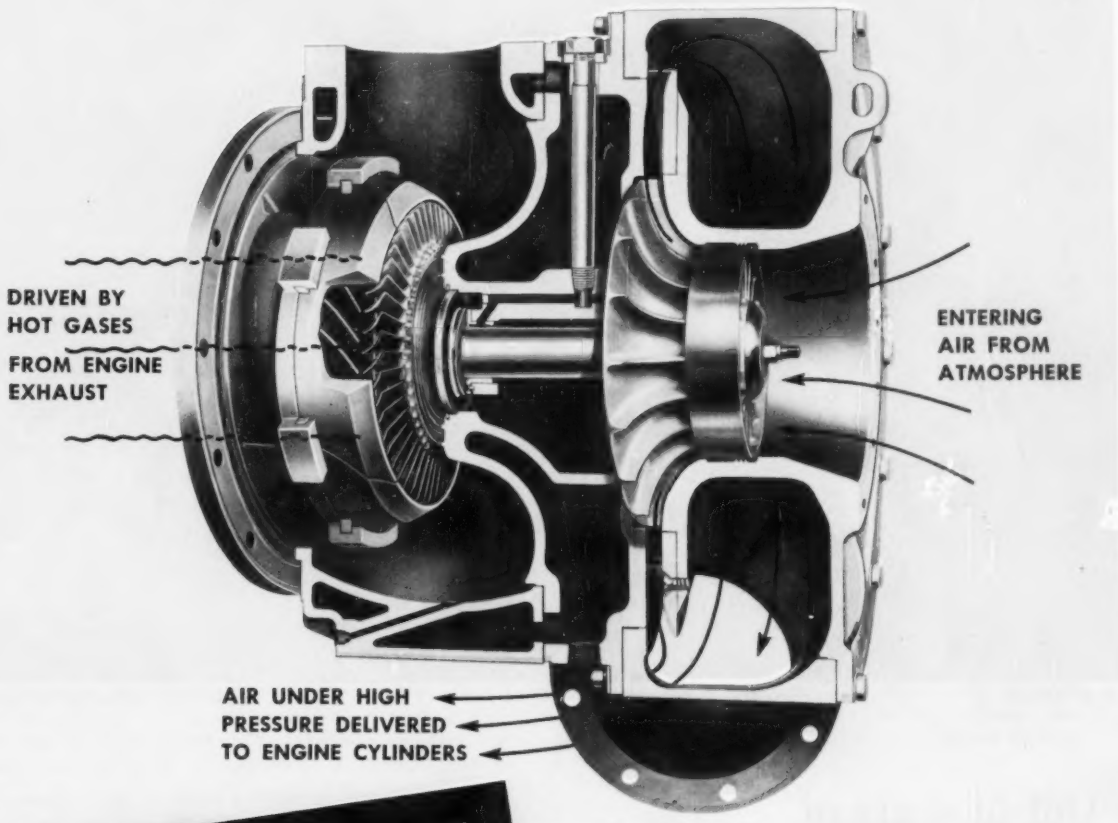

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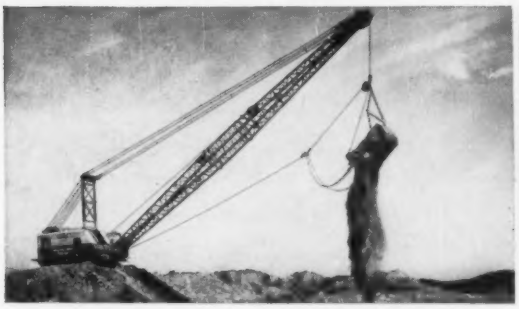

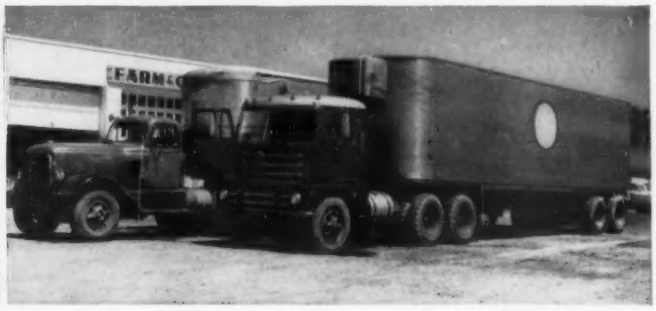

FOR MECHANIZED DIESELS, there's a Cities Service diesel oil for every operating condition. Most widely used is Cities Service C-300 Motor Oil, which has improved performance and lowered maintenance costs for a host of truckers, quarry operators, and mining men. Shovel above logged 16,280 hours with no repairs, no increase in oil consumption. A Cities Service Lubrication Engineer will gladly show how you can achieve similar results.

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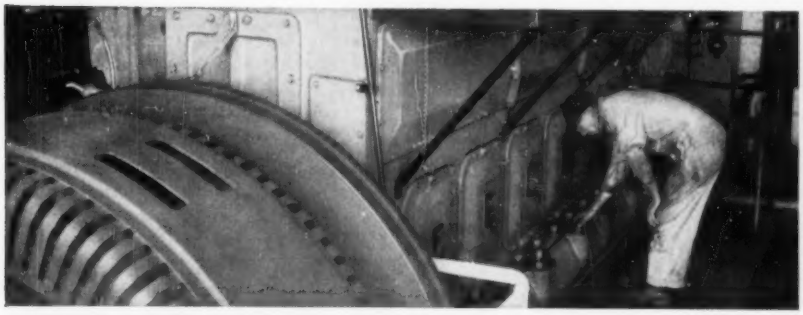
is Cities Service Diesel Oil!



FOR STATIONARY DIESELS, Cities Service C-300 Lube Oil has won high praise from numerous users. Example: Paulding Light and Water reports 16,587,402 H.P. hrs. without oil change; gets 23,205 BHP hrs. per gallon consumed! For more information, write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

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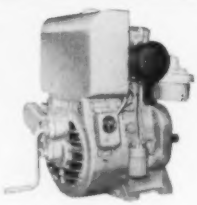
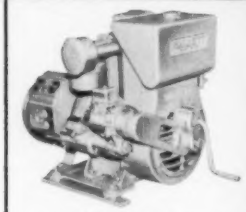
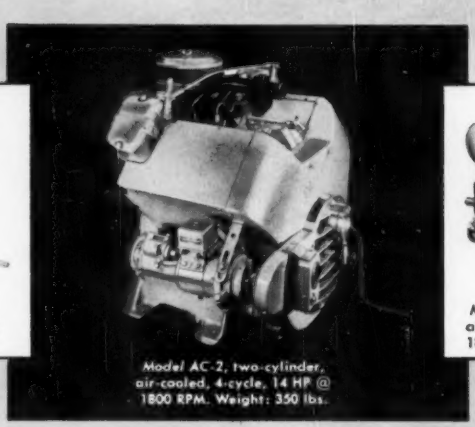


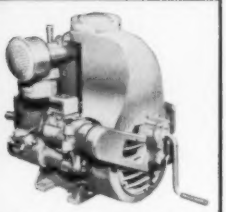
Model WC-1, one-cylinder, water-cooled, 4-cycle, 6 HP @ 1800 RPM. Wt.: 220 lbs.



Model AIQ-3KW, one-cylinder, air-cooled, 4-cycle, 3KW @ 1800 RPM, 6-7 HP



Model AC-2, two-cylinder, air-cooled, 4-cycle, 14 HP @ 1800 RPM. Weight: 350 lbs.



Model AC-1, one-cylinder, air-cooled, 4-cycle, 6 HP @ 1800 RPM. Weight: 220 lbs.

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- ★ ***All*-American, from basic materials to completed engines**
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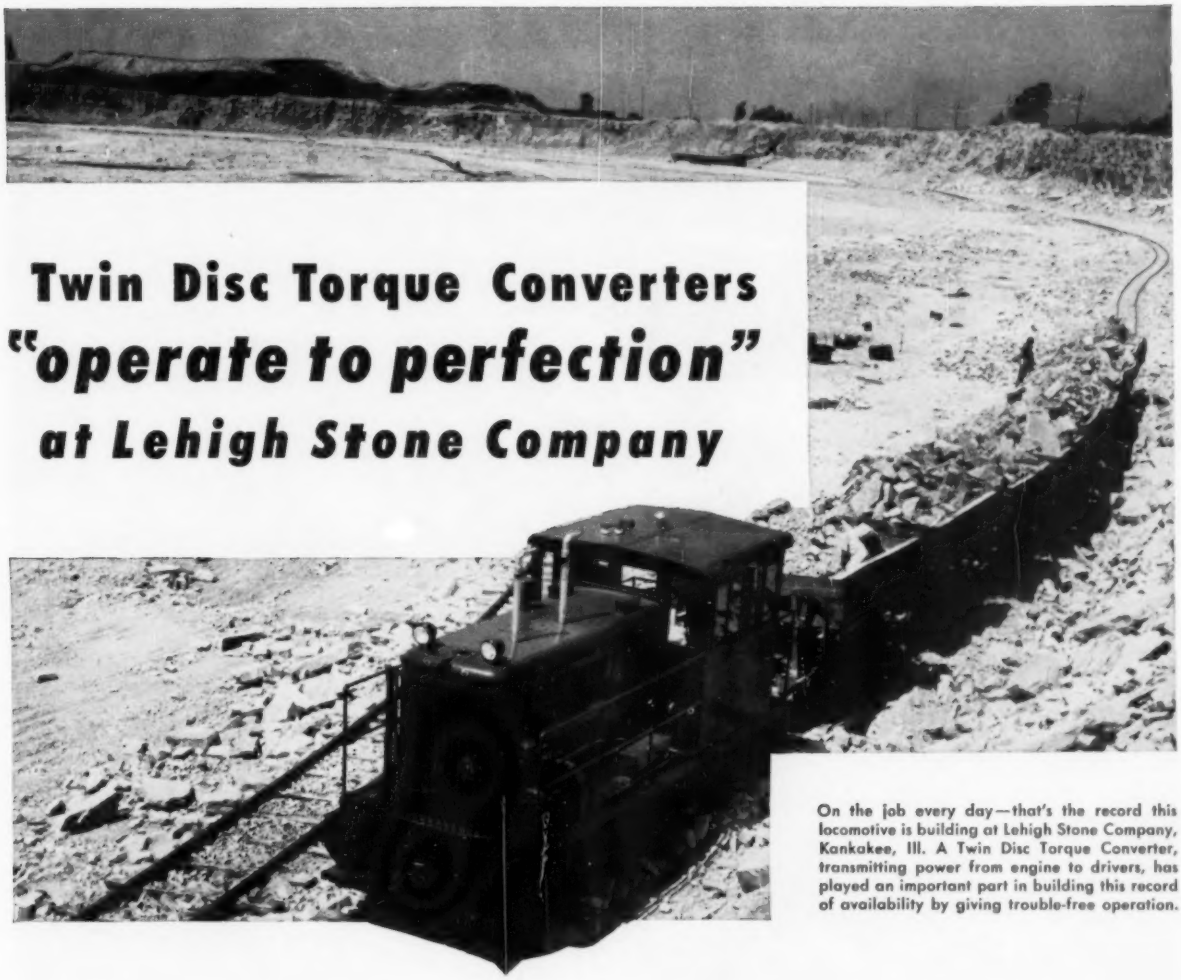

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On the job every day—that's the record this locomotive is building at Lehigh Stone Company, Kankakee, Ill. A Twin Disc Torque Converter, transmitting power from engine to drivers, has played an important part in building this record of availability by giving trouble-free operation.

A re-built pit locomotive—powered by an International UD-24 Diesel Engine, driving through a Twin Disc Torque Converter—was the result of a modernization program, by Lehigh Stone Company, Kankakee, Ill., that ingeniously utilized components from worn-out steam-driven locomotives.

The original unit proved so successful that to date, four of these locomotives have been built. The result is a great saving in original cost over similar sized *new* locomotives, as well as a substantial reduction in operating cost, compared to steam.

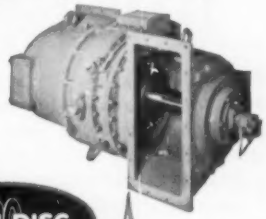
International UD-1091's, which replaced the UD-24's in later models, have identical dimensions, but provide more power and higher speed, which make them even more adaptable for use with the Twin Disc Three-Stage Torque Converters.

"The torque converters have operated to perfection, requiring no maintenance or repair other than changing oil and filter elements," states General Superintendent Delmor Groff. "In a recent haul test our tractive force was much better than expected."

Locomotive operators everywhere are finding similar results when Twin Disc Torque Converters are installed. Twin Disc Torque Converters permit smooth, fast acceleration . . . eliminate equipment-wearing shocks and stresses . . . provide maximum torque and tractive effort to the drivers—when needed most!

Specify a Twin Disc Torque Converter in your next locomotive or locomotive conversion. Take advantage of the many profit-making, cost-cutting features incorporated into Twin Disc Torque Converter Drives.

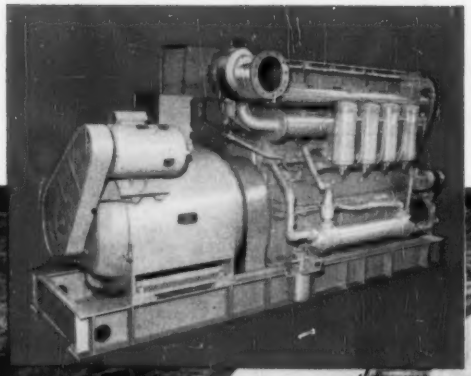
For complete details, write Twin Disc Clutch Company, Hydraulic Division, Rockford, Ill. Request Bulletins 135-E and 508 (three-stage and single-stage torque converters).



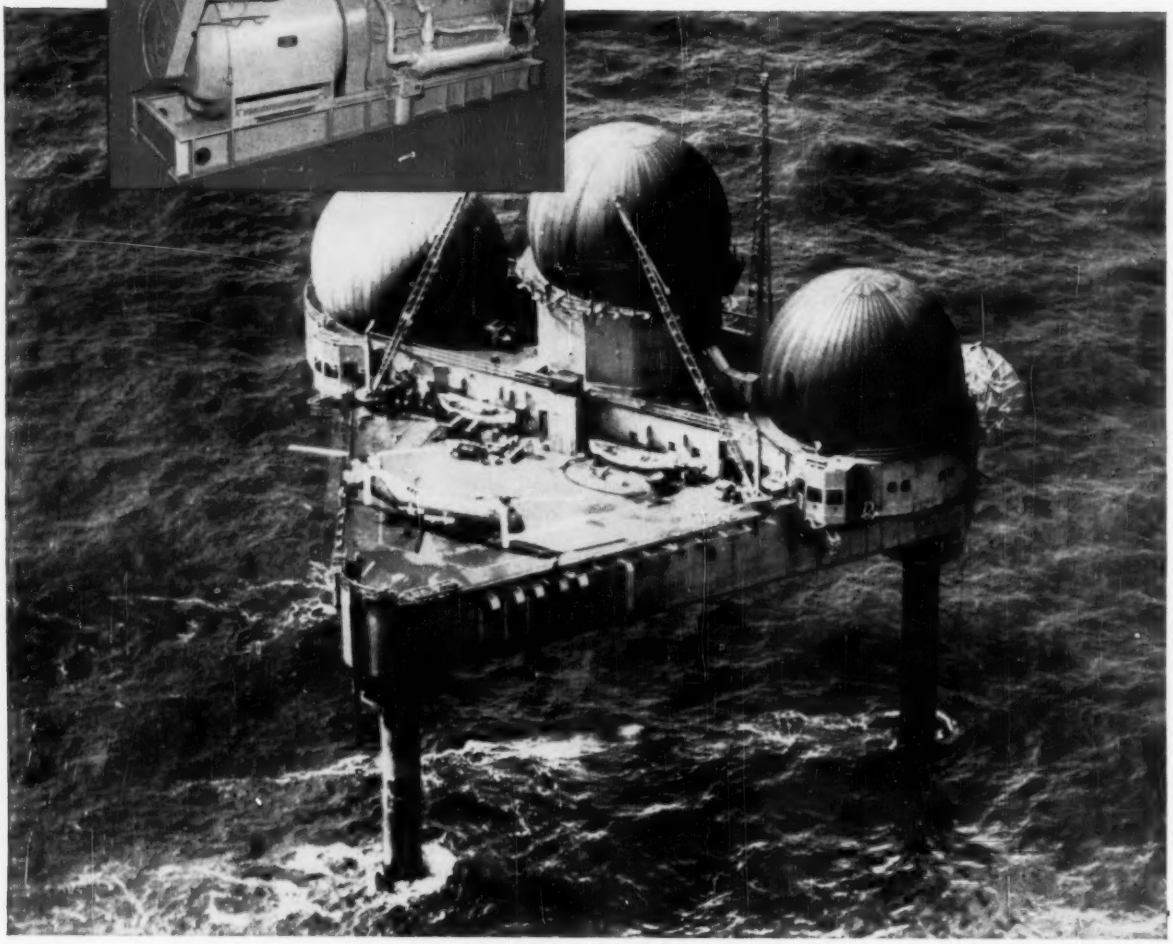
TWIN DISC

TWIN DISC
Torque Converters

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division) Rockford, Illinois



Powered by White's Superior Diesels...



United Press Photo

TEXAS TOWERS' WARNING WILL ALERT OUR NATION

This U. S. Air Force early warning radar station off the coast of Cape Cod is called the Texas Tower. Aboard the Tower, radar eyes search the skies. In the event of approaching enemy bombers, a push of one red button will warn our coastal areas and start our air defense into action!

Two more Towers are now being built for the U. S. Air Force by the U. S. Navy, to be a vital part of our nation's far-reaching radar air defense system. They require high-quality, heavy-duty equipment giving dependable performance with minimum maintenance over long periods of continuous service. White's Superior Diesel engines meet these requirements . . . they have been selected to generate the power for the vital radar operations, and also for the radio, communication, heating, lighting and ventilating equipment aboard the additional Towers.

If you require rugged, heavy-duty, high-quality Diesel engines for the most dependable and economical operation, choose White's Superior Diesels. There's a size and type for virtually every requirement from 215 to 2150 horsepower, or 150 to 1500 KW. Get complete information now.

Superior ENGINES · ATLAS Imperial DIESEL ENGINES · White DIESEL

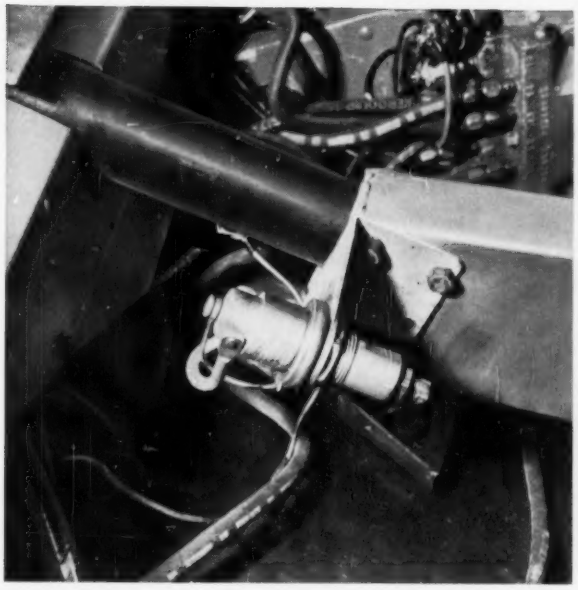
WHITE DIESEL ENGINE DIVISION

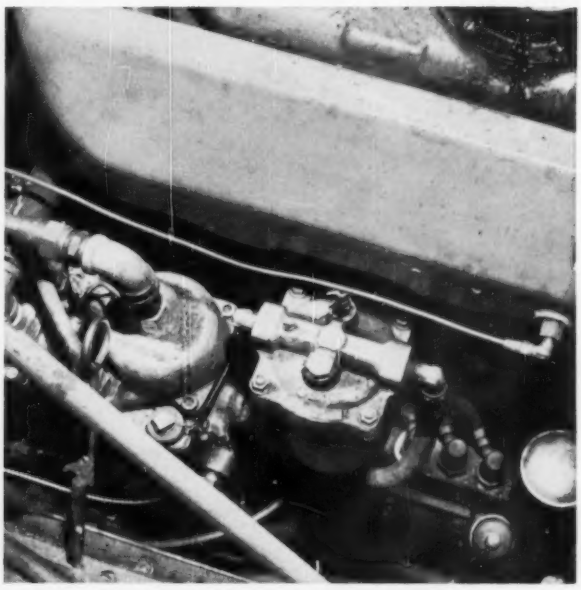
THE WHITE MOTOR COMPANY *Plant and General Offices: Springfield, Ohio*

The Engineer's Field Report

CASE HISTORY
PRODUCT Chevron Pressure Primer System
FIRM Consolidated Freightways Inc., Portland, Oregon

Pressure Primer System starts diesels on 1st or 2nd turn with regular batteries—at minus 40°





BELOW ZERO starting temperatures are common 5 months a year for Consolidated Freightways equipment operating in Mountain and Plain States. Two hundred and forty-four of the company's tractors are equipped with the Chevron Pressure Primer System. Since this installation, rigs start on first or second turn at 40° below zero—using regular equipment batteries! Normally in these sub-zero temperatures, regular batteries give out after about 4 turns. Sure starts plus the fact engines are primed with Chevron Pressure Primer bulbs, controlled from within the cab, saves Consolidated Freightways important man-hours and speeds operating schedules. Picture above (left) shows a Chevron Pressure Primer Discharger mounted on steering column. Highly volatile priming fuel is atomized through tubing into manifold (right) under 250 lbs. pressure.

FREE FOLDER tells you more about Chevron Pressure Primer System and how to install it on different engines. Write or ask for it today.

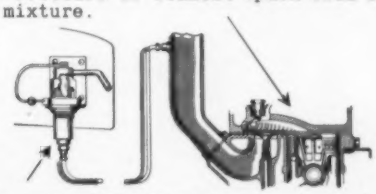
FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor, write or call any of the companies listed below.

CHEVRON

TRADEMARK "CHEVRON" REG. U. S. PAT. OFF.

Why Chevron Pressure Primer System helps starting

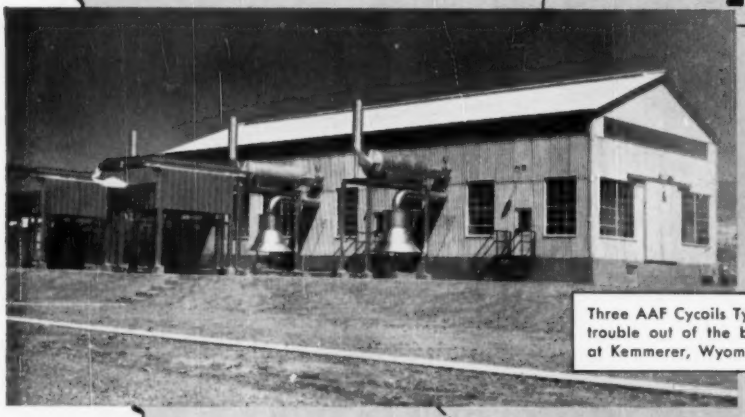
Volatile Chevron Priming Fuel atomizes in induction system at temperatures as low as -65°F. Pressure or weakest spark from engine fires mixture.



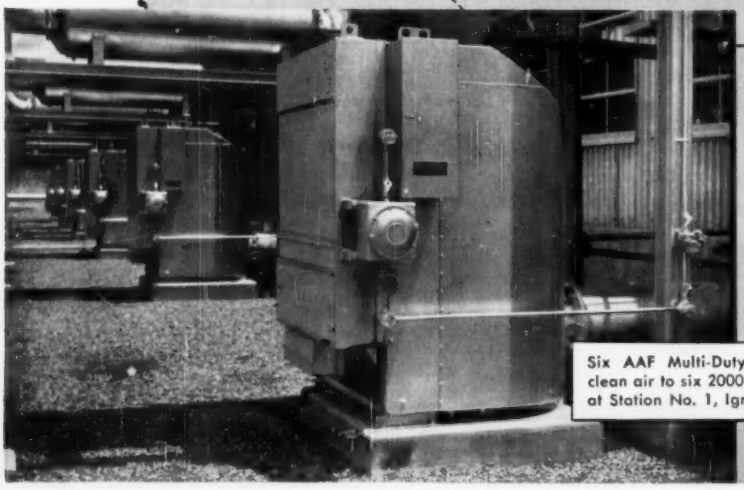
Simple, rugged discharger prevents fuel leakage. Small, safe steel bulbs protect fuel from water and dirt.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado

$200,000,000 PIPELINE BY AAF CYCOIL AND



Three AAF Cycoils Type P keep dust trouble out of the big compressors at Kemmerer, Wyoming.



Six AAF Multi-Duty filters deliver clean air to six 2000 hp compressors at Station No. 1, Ignacio, Colorado.

PROTECTED EXCLUSIVELY MULTI-DUTY FILTERS

82,780 Compressor HP on Pacific Northwest System Depends Upon American Air Filter Equipment

When you're moving 393,000,000 cubic feet of gas per day over 2,571 miles of pipeline, you can't take chances with equipment failure! Pacific Northwest Pipeline doesn't. Every one of the huge compressors at the thirteen main line and two booster stations is protected against dirty air by AAF Cycoil and Multi-Duty filters.

Filter selection for Pacific Northwest was of prime importance. AAF equipment was chosen exclusively because AAF filters have proved their dependability in thousands of installations where dust-free air *had* to be provided for vital engines and compressors.

Uniform air delivery, constant efficiency, low operating resistance and infrequent maintenance are "musts" for true dust protection. If you would like more information on the way AAF delivers these advantages, consult your AAF representative or write to American Air Filter Company, Engine and Compressor Division, Louisville 8, Kentucky.

AAF
herman nelson

American Air Filter
COMPANY, INC.
445 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

Type CMS Multi-Duty Filters

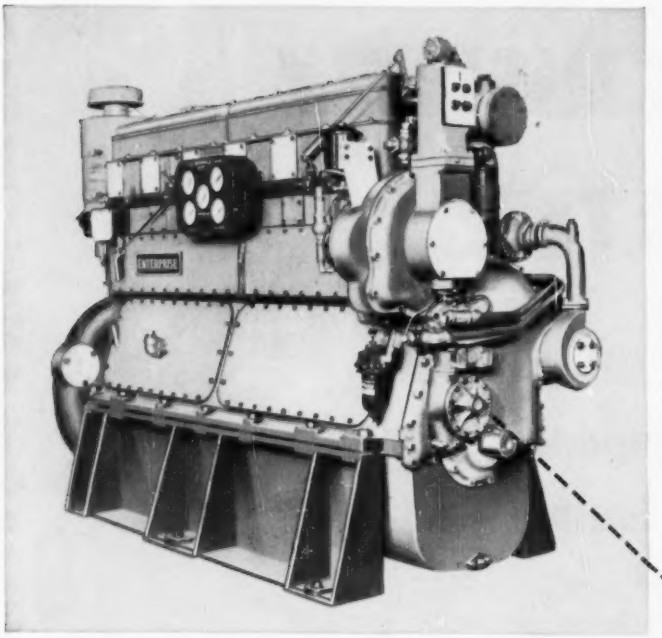
Type G Pipeline Air Filters

— BETTER AIR IS OUR BUSINESS —

Type OCH Intake Air Filters

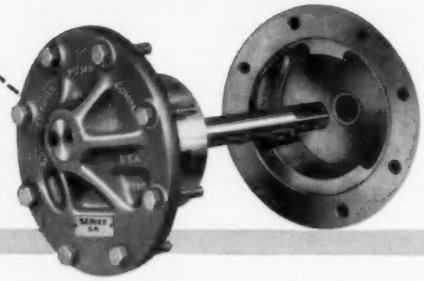
Cycoil Oil Bath Air Filters

ANOTHER PUMP PROBLEM...SOLVED BY **TUTHILL**



AUTOMATIC PRESSURE LUBRICATION FOR ENTERPRISE DIESEL... WITH

TUTHILL PUMPS



The intercooled Enterprise DSM-8 Diesel shown here was built for use on the government railroad in Saudi Arabia under ambient temperature conditions up to 130°F. Other Enterprise diesels are used for oil field petroleum pumping, marine applications and for a variety of other services.

In applications like these, dependable operation and minimum maintenance are *musts*. Therefore, Enterprise engineers took special pains to build into their units fool-proof positive pressure lubrication systems. For example, the complete lubrication system to all moving parts of the DSM-8 above includes pressure lubricated valve rocker-arm assemblies and rifle drilled crank shaft and connecting rods for pressure lubrication of connecting rod and piston pin bearings.

Naturally, Enterprise's engineers chose the TUTHILL MODEL 5CSA pump as the heart of their lubrication system. For Tuthill has a long and enviable record in meeting requirements of the diesel industry. And the Model 5CSA provides the performance characteristics and dependability required in this demanding application.

Model 5CSA, like all Tuthill Series SA stripped pumps, incorporates all the advantages of Tuthill's positive displacement internal-gear design. In the SA Series the mounting brackets and housing normally furnished with Tuthill pumps have been removed. Only the essential pumping elements are provided—the rotor, and the idler and cover assembly. This allows diesel manufacturers to incorporate the dependability of Tuthill pumps directly into the design of their machinery...with the greatest possible economy of space and material...with significant improvements in appearance...at an economical price.

In addition to the SA Models, Tuthill furnishes also Model "S" pumps complete with housing but without mounting brackets. Investigate the advantages of Tuthill stripped pumps in your equipment. Call your Tuthill representative today.

TUTHILL PUMP COMPANY
945 East 95th Street, Chicago 19, Illinois
Gentlemen:
☐ Please forward information on Series SA.
☐ Please forward information on S Series.
☐ Please forward information on complete Tuthill line.
NAME_____ TITLE_____
COMPANY_____
STREET_____
CITY_____ STATE_____

Tuthill Manufactures a Complete Line of Positive Displacement Rotary Pumps in Capacities from 1 to 200 GPM, for Pressures to 600 PSI, Speeds to 3600 RPM.

TUTHILL PUMP COMPANY

945 East 95th Street, Chicago 19, Illinois
Canadian Affiliate:
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ontario, Canada

PUMPS FOR YOUR PURPOSE

SCHWITZER

TURBOCHARGERS

"ORBIT-SEEKING," "INSTANT-ACTION" WHEELS

These and other features exclusive in Schwitzer Turbochargers, account for proven installed performance and durability.

"Orbit Seeking" Wheels, as pioneered in Schwitzer Turbochargers, are now being featured in the Turbine Engine Industry.

"Instant Action" wheels assure rapid compressor acceleration for the best installed engine performance.

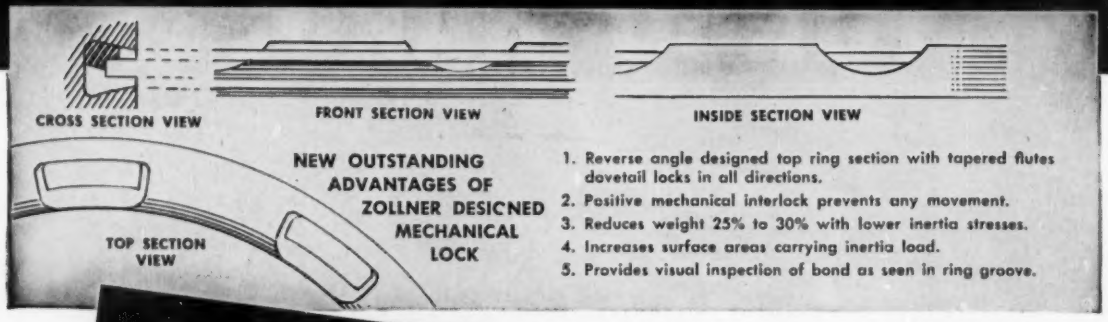
As your supplier, Schwitzer assures you of the most advanced design and economy in the field of fluid flow and vibration damping products.

SCHWITZER CORPORATION

INDIANAPOLIS, INDIANA

BOND-O-LOC* PISTONS

WITH "NI-RESIST" IRON TOP RING SECTION


CROSS SECTION VIEW
FRONT SECTION VIEW
INSIDE SECTION VIEW
TOP SECTION VIEW
NEW OUTSTANDING ADVANTAGES OF ZOLLNER DESIGNED MECHANICAL LOCK

1. Reverse angle designed top ring section with tapered flutes dovetail locks in all directions.
2. Positive mechanical interlock prevents any movement.
3. Reduces weight 25% to 30% with lower inertia stresses.
4. Increases surface areas carrying inertia load.
5. Provides visual inspection of bond as seen in ring groove.

Double Bonded
METALLURGICALLY Al-Fin Bond
MECHANICALLY Zollner Lock

STOPS!

RING GROOVE WEAR IN HEAVY DUTY SERVICE

"Sensational mileage" is the unanimous report of heavy duty engine builders and transport operators using Zollner "Bond-O-Loc" Pistons. Another great development by Zollner engineers, this super-mileage piston has a "Ni-resist" top ring groove section *permanently* incorporated with the *double* bond of *both* Al-Fin metallurgic *and* the exclusive Zollner mechanical lock. Separation failure is impossible. Ring groove wear problems are eliminated, blow-by prevented, oil consumption minimized, mileage to overhauls greatly increased. We suggest an immediate test of these sensational advantages for your engine.

Licensed under Patents 2,396,730; 2,455,457; 2,550,879
*T. M. Reg. Pat. App. For

ADVANCED ENGINEERING
PRECISION PRODUCTION
COOPERATION with Engine Builders

ZOLLNER PISTONS

THE ORIGINAL EQUIPMENT PISTONS

ZOLLNER

ZOLLNER • Fort Wayne, Indiana

NEW

SIOUX

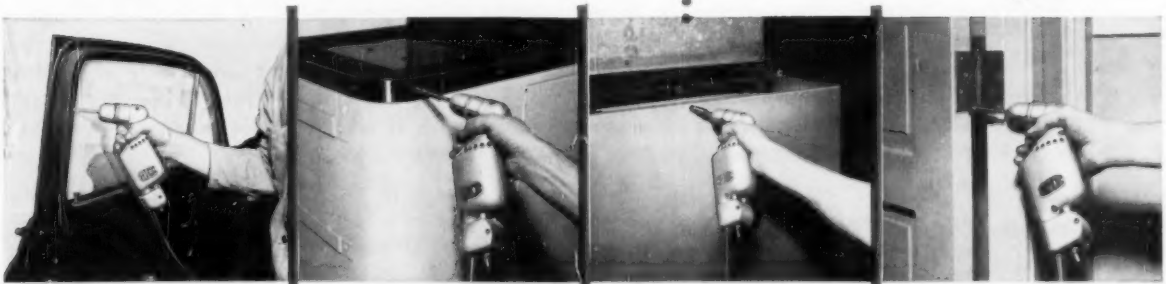
ALL-ANGLE

ELECTRIC SCREWDRIVER

Here is really an amazing tool. It will do everything the conventional designs will do, and much more. It will work in extremely close quarters where there wouldn't be clearance for the others.

It will drive, set and remove wood screws, self tapping screws, lag screws, and machine screws and nuts. An optional adjustable clutch may be set to provide uniform tightness, or the operator can control tightness with hand pressure. Available bits include Standard Screw Driver, Phillips, and Socket Wrenches.

It will deliver the long, trouble-free Service everyone expects of a SIOUX Tool. Look for SIOUX under "Electric Tools" in the yellow pages.



Cuts the time in half in Auto Body work

Speeds the Factory Assembly Line

A Natural for Duct Work inside or outside

For the Building and Woodworking trades

SIOUX

ALBERTSON & CO., INC.

SIOUX CITY, IOWA, U.S.A.

ELECTRIC DRILLS • SANDERS • GRINDERS • IMPACT WRENCHES • POLISHERS • PORTABLE SAWS • FLEXIBLE SHAFTS • VALVE FACE GRINDING MACHINES • ABRASIVE DISCS

There is NO SUBSTITUTE for a forging: NO SUBSTITUTE for Wyman-Gordon Experience

There is more to the superiority of the forged crankshaft than just strength.

No other method of fabrication can compare with the forging process for dependability. The uniformity and predictability of physical properties with minimum variance from piece to piece or from one location to another in the same piece is assured to the greatest degree by modern forging practice.

Top automotive engineers agree that the use of a forged crankshaft permits the design of a more compact engine which is a decided advantage when thinking in terms of limited space available and overall engine weight reduction.

As compression ratios increase and engine outputs go up the risk factor must be reduced. Again, the uniformity of quality in the backbone of the engine, the crankshaft, is most essential and made possible only by a forging.

There is NO SUBSTITUTE for a forging and in a forging there is NO SUBSTITUTE for WYMAN-GORDON quality and experience.

WYMAN-GORDON COMPANY

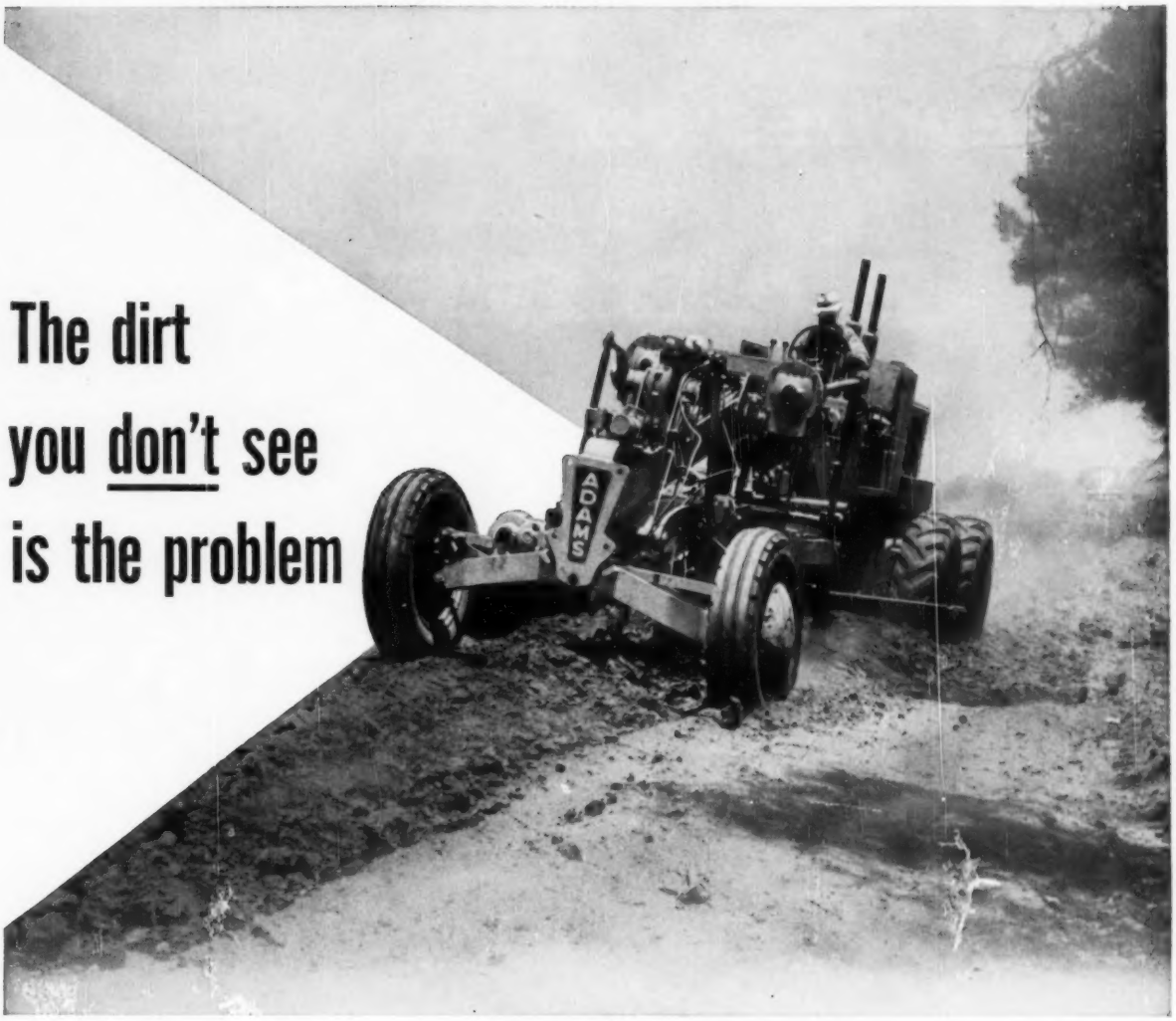
Established 1883

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER 1, MASSACHUSETTS

HARVEY, ILLINOIS • DETROIT, MICHIGAN

The dirt you don't see is the problem



Le-Tourneau-Westinghouse Adams "660" Grader, powered by 150 H. P. Diesel Engine

Dry Type Micronic® Air Filtration solves it

The tons of dirt this grader moves in a day don't give it any trouble at all. But just let a little of the dirt that's drawn in with the air intake get through to the engine and it'll stop dead in its tracks. That's why efficient air filtration is so vital to the operation of this equipment . . . why engine and equipment manufacturers have accepted PurOlator's new Dry Type Micronic® Air Filter as the most efficient yet developed.

Whether your engine is idling or revving at top speed, this new Purolator Air Filter removes 99% of all contaminants. That makes it virtually impossible for harmful abrasives to get into the precision parts of the engine no matter how dirty the job or where you're working. The Dry Type Micronic elements save time and effort in servicing, too. Elements can be replaced in one-tenth the time — and with one-tenth the effort — needed to service other types.

Purolator Catalog AFC-56 contains a valuable chapter "Facts about engine air requirements" that can help you prolong engine life and reduce repair bills. Send for your free copy today. Address Dept. DP9-111.

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

Rahway, New Jersey and Toronto, Ontario, Canada

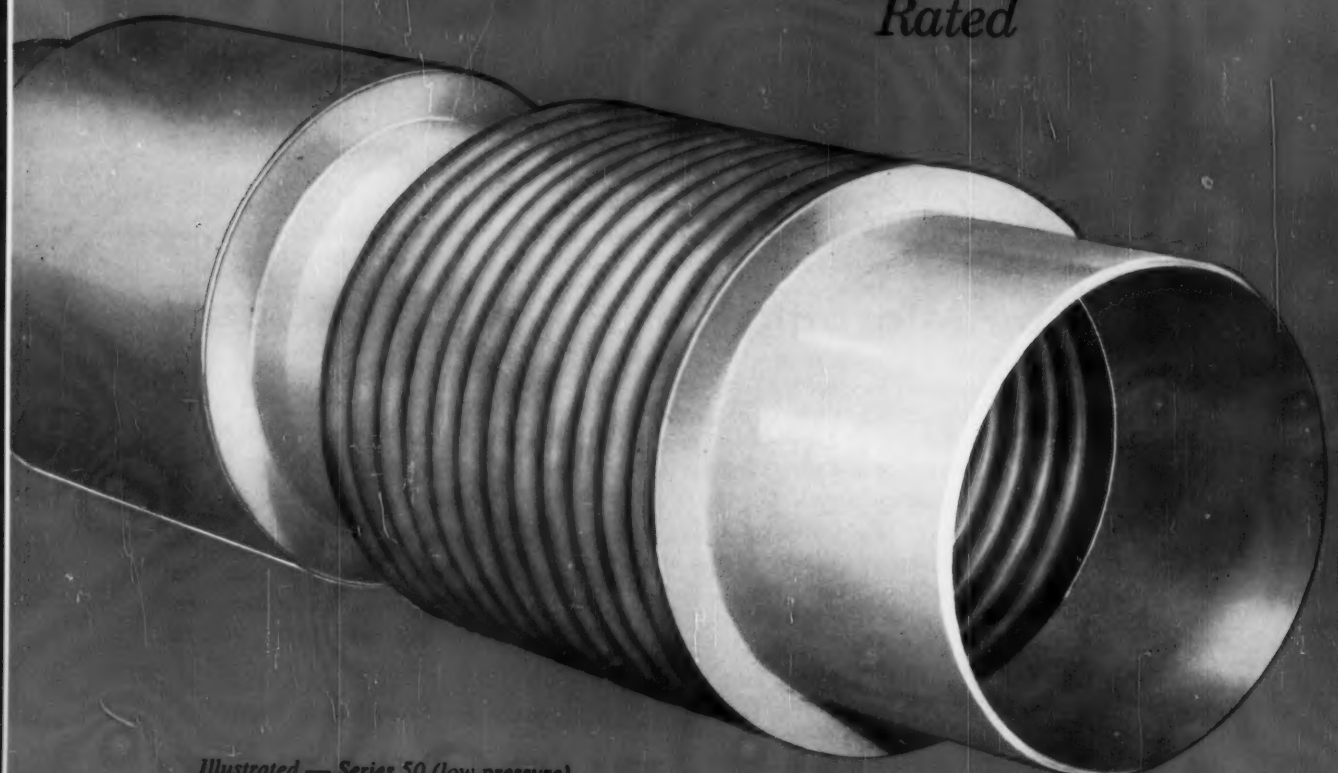
a **NEW DESIGN** from the world's

BADGER

S·R*

EXPANSION JOINTS

* *Service-Rated*



Illustrated — Series 50 (low pressure) S-R Double Joint with welding ends. Cover removed from one bellows.

most experienced manufacturer

Revolutionary new design provides longer cyclic life... less weight... better equalization

Over three years of intensive research and testing have paid off! Badger S-R Expansion Joints — corrugated packless expansion joints of an entirely new design — are ready for your most exacting power, heating, industrial and process piping applications.

Two significant features of the new joints are 1.) Curvilinear Corrugations, which result in natural "all-curve" flexing and equal distribution of movement among the corrugations; 2.) tubular Reinforcing Rings, which work with the new corrugations to produce greater effective flexing height and "all-curve" flexing even under higher pressures and temperatures.

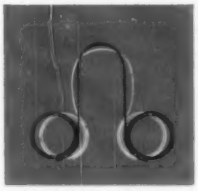
And there are other important features, too . . . size for size, Badger S-R Joints weigh up to 50% less than conventional types . . . new ring design reduces joint diameter . . . a complete line of accessories — including covers and liners — are available . . . standard models in stainless, monel and inconel, special types in any workable alloy.

Cutaway view Series 150 (intermediate pressure) S-R Joint

New corrugation and ring designs produce better equalization, "all-curve" flexing

Series 50 (low pressure) S-R Expansion Joints

The radically different Curvilinear Corrugations used in Badger S-R Expansion Joints were developed by the Badger Research Department. As shown in the cross-section of a Series 50 Joint (left), the design produces more uniform movement per corrugation and flexing to a natural "all-curve" shape, which results in lower stresses and therefore increased life. (White line in diagram shows the efficient "all-curve" shape the corrugations *naturally* assume under operating pressures.)


Series 150 (intermediate pressure) S-R Expansion Joints

Series 150 S-R Joints feature Curvilinear Corrugations and, because they are used at higher pressures, also have tubular Reinforcing Rings. A significant engineering improvement, these new rings make metal-to-metal contact only in the "valley" of each corrugation yet allow natural "all-curve" flexing (white line) when the pipeline is subjected to pressure. The tubular shape of the rings also permits greater effective flexing height and therefore contributes to longer joint life.

Learn more about ways S-R Joints can be of advantage to you . . .

New illustrated brochure describes them in detail — mail coupon for your free copy today.

© 1956 BMC

Badger Manufacturing Company
230 Bent Street
Cambridge, Massachusetts

Name _____

Company _____

Street and No. _____

City _____ Zone _____ State _____

ON SHORTLINE AS WELL AS MAINLINE ROADS IT'S BENDIX FUEL INJECTION

All over the country shortline railroads like those listed here are giving 'round-the-clock service that helps make the American railroad system the envy of the world.

Using 70-ton and 95-ton General Electric road switchers powered by Cooper-Bessemer engines with Bendix* Fuel Injection Equipment, these shortline roads maintain high operating standards in the performance of their important work.

Bendix is proud that its fuel injection equipment has received such high endorsement from so many shortline railroad operators.

It furnishes further evidence that when dependable, efficient, and economical operation is a must Bendix is the logical choice for fuel injection equipment. SCINTILLA DIVISION OF BENDIX AVIATION CORP., SIDNEY, N.Y. EXPORT SALES AND SERVICE: BENDIX INTERNATIONAL DIVISION, 205 EAST 42ND ST., NEW YORK, N.Y. *REG. U.S. PAT. OFF.

This Bendix pump and nozzle are used on the type of road switcher pictured above.

Partial list of shortline roads using Bendix Fuel Injection Equipment

ALBANY & NORTHERN
ARKANSAS & OZARKS
BALTIMORE & ANNAPOLIS
BARRE & CHELSEA
BELFAST & MOOSEHEAD LAKE
COLORADO & WYOMING
DES MOINES & CENTRAL IOWA
EAST ERIE COMMERCIAL
FT. DODGE, DES MOINES & SOUTHERN
FRANKFORT & CINCINNATI
GEORGIA NORTHERN
GREENVILLE & NORTHERN
HAMPTON & BRANCHVILLE
LANCASTER & CHESTER
LIVE OAK, PERRY & GULF
MISSISSIPPI EXPORT
MOBILE & GULF
MUNCIE & WESTERN
NORTHAMPTON & BATH
RAHWAY VALLEY
SANFORD & EASTERN
SOUTH GEORGIA
TALLULAH FALLS
VALDOSTA SOUTHERN
WASHINGTON & OLD DOMINION

Scintilla Division

Bendix
AVIATION CORPORATION

For a Strong Industry Association

Two hairy characters dressed in gray wolf skins and with flint-cut hair do's formed the first association. It was the "Mutual Benefit Society to keep the Brontosaurus out of the Garden Patch". The idea caught on and persisted, though the brontosaurus is gone and the garden patch is now cultivated with a diesel tractor. Try and imagine modern industry without its associations. If nothing else, they are service organizations that focus composite ideas of their members into a clearcut picture. Thus they can promote an industry's legitimate objectives with a single loud voice. They render service to and for the industry. Look what the ARBA did in promoting the National Highway Program. It was a real accomplishment, benefitting the country as a whole. Why can't we have stronger and more comprehensive programs in our associations? Better overall industry promotion, statistical services, and closer cooperation with allied-industry groups are suggested as a starter. Meanwhile, we see moves to organize parts of our industry. In September we reported the founding of the "Society of Diesel Maintenance Engineers" by the Diesel Department of the Nebraska State Trade School, Milford, Nebraska. Its national objective—professional improvement of men in the field, something we've tried to do editorially for years. Both quantity and quality of skilled diesel men are cited as a major industry problem. Why not tackle it on an industry rather than an individual company basis? Now, here's a new organization, the "Association of Diesel Specialists" (details elsewhere). Members service and sell fuel injection equipment, governors and related accessories, using "manufacturers' approved methods and specifications and exercising business ethics compatible with the best interests of the Diesel Engine Industry." Good, huh? And good for our industry. But why should all the impetus come from the field? A strong and alert industry association should know the problem areas and undertake to promote and aid these actions that have been taken independently. There is ample evidence that objectively promoting the whole industry results in benefits to each part. It's good business.

B P E

THE UNBEATABLE PAIR...

When chrome is added to Cyclan for Sealed Power Chrome-faced Cyclan

PISTON RINGS FOR DIESELS

• THEY BEAT HEAT • THEY BEAT BREAKAGE
• THEY BEAT EXCESSIVE SIDE WEAR • THEY BEAT FRICTION AND CORROSION
• THEY BREAK IN FAST AND WEAR... AND WEAR... AND WEAR!

SEALED POWER CORPORATION • MUSKEGON, MICHIGAN • ST. JOHNS, MICHIGAN • ROCHESTER, INDIANA
DETROIT OFFICE • 7-236 GENERAL MOTORS BUILDING • PHONE TRINITY 1-3440

Sealed Power Piston Rings

PISTONS • CYLINDER SLEEVES

Leading Manufacturer of Automotive and Industrial Piston Rings since 1911
Largest Producer of Sealing Rings for Automatic Transmissions • Power Steering Units

highlights

Wholly-Owned Subsidiary is to be established by Cummins to build engines in Scotland. When completed, a high percentage of the engines will be for the export market.

EMD's Power Packs for utility service, both rail and trailer mounted, are currently being used in four foreign countries, as well as throughout the United States.

Air-Cooling seems to be taking over in foreign engines below 200 horsepower. The trend is strong. Take Klockner-Humboldt-Deutz, for example. Up until May of 1954 only 100,000 air-cooled engines had been produced. In the next two years this figure was doubled.

Aluminum for Milady's Gowns; Nylon for Heavy-Duty Industrial Parts! From pistons, blocks and heads to fabrics is a big jump. So is the switch from fabrics to bushings, bearings and gears. It shows the versatility of modern materials and provides designers with better tools to produce better engines.

A Monthly Weather Forecast covering the country is produced by Markel Service, Inc. in the interest of highway safety. Weather trends are of help to bus and truck fleets in anticipating weather problems. Markel is the safety engineering arm of American Fidelity and Casualty Company, understandably interested in highway safety.

Tenders for $18-Million of Construction Equipment will soon be invited by the Philippine government. Needs were announced by the Secretary of the Department of Public Works, Manila, and reported in "Spotlight" of world business published by The Economist Intelligence Unit Ltd. U. S. normally supplies bulk of Philippine imports of this equipment and our firms should get a good chunk of this business.

A Centralized Motive Power Control bureau to assure that the New York Central System's 1300 diesel road locomotives are worked at their maximum capacity has been established at the road's N. Y. headquarters.

Growth and Expansion of Aluminum Market is seen by Alcoa. Technical advances of research and development, and a plentiful supply of metal are expected to provide impetus. Aluminum is finding more widespread use in the diesel industry, with the desire for lighter power units and the possibilities to use less expensive castings.

Crackdown on Truck Mileage Tax and registration fees is announced by New York's Commissioner of Taxation and Finance. Too many violators last year. A word to the wise . . . .

1221 New Locomotive Units were installed on class I railroads during the first ten months of 1956, compared to 894 in the same period last year. All units installed this year were diesel-electric, except for three electric units.

A-Locomotive Seen Prohibitive. The first atom-powered locomotive will have a price tag of about $20 million, compared with the present cost of about $3 hundred thousand for a two-diesel locomotive. Maintenance costs are expected to be roughly double the cost of running an equivalent diesel engine.

Piston Engines are Here to Stay Awhile despite current optimism concerning gas turbines and the free-piston engines. This is the contention of Darl F. Caris of GM Research Staff, Automotive Engines Department, voiced at a recent Metropolitan Section, SAE meeting. He reports that piston engines are going through their most intensive period of development and that their competitive position is improving.

1957 Outlook Good

Gain in Diesel Engine Sales of Over 18% Predicted

Sixth Andrews' Board study, made exclusively for Diesel Publications, Inc., indicates highest total production and sales of diesels, dual-fuel, and natural gas engines since the defense-inspired peaks of World War II days. Here is how sales are predicted to go in nine major fields of usage.

Diesels in General

Sales in 1957 are expected to exceed the sales record of 1956 in the majority of industries using diesels—even in the case of the long-depressed agricultural field. The future for diesels is viewed as substantially good, being modifiable, however, by the extent and ingenuity of promotion in this industry, which many economists in the board of analysts of Future Sales Ratings believe has not taken full advantage of its sales potentials in U. S. industry.

Generally, the diesel engine's status is regarded highly, and intrinsically it should do well against the increased competition likely in 1957 from rival power machinery. The diesel engine industry fully merits the five-star top, Future Sales Rating and certainly continues as a salient avenue for cost reduction and increased production in American industrial and agricultural operation.

Analyses of major segments of diesel usage and statistics of what happened in recent years with projections of what's for 1957 follow.

Railroads

The year 1956 has been an excellent one for railroad operating revenues, with gains over both 1955 and 1954. This factor along with the realization that some railroads have been behind on maintenance and new equipment acquisition, have resulted in a boom year for railroad equipment purchases.

Expenditures for all railroad equipment in the first nine months of 1956 approximated $1,025,000,000, a jump of $414,000,000 (or 67%) over the $611,000,000 spent by railroads in the first nine months of 1955.

Diesel engines did not experience as great a relative percentage gain as this, inasmuch as this division is a specialized one, and dieselization has been in progress for a number of years as the modern trend for economizing regardless of business trends.

Nevertheless, the number of diesel-electric units installed in 1956 showed a large gain over 1955. In the first half of 1956 there was an actual installation of 785 new diesel units, and it is assumed that all the units on order on July 1, plus a few ordered after that date, will be delivered before the end of the year.

The board feels that the year 1957 will run approximately the same as 1956. Steam locomotives are still being retired at a rate of more than 200 a month, but this rate cannot continue very much longer, as there were relatively few remaining at the end of 1956, and not all of these will actually be in service. The installation of 1,625 new diesel units in 1957 should offset steam retirements and provide capacity for a moderate increase in traffic.

New diesel-electric units installed in 1955 and estimated for 1956 and 1957 follow:

	Railroads		
Year	*Class 1*	*Others*	*All U.S. Railroads*
1957 Est.	1600	25	1625
1956 Est.	1600	25	1625
1955	1172	28	1200
1954	1097	43	1140
1953	2122	79	2201
1952	3035	105	3140

Highway Transportation

Large intercity carriers of freight and passengers continue to operate at high levels, with the forecast bright. Over the highway tonnage in 1956 was running about 8% ahead of 1955. Equipment wear and tear was exceptionally heavy, necessitating large replacement demand for diesels, as well as for new equipment. Bus transportation likewise is in a favorable phase, with prospects promising in view of fine new equipment, low fares and new conveniences in bus service.

Diesel engine sales for highway transportation jumped sharply in 1955, with further substantial gains indicated for 1957. Contributing to this expectation is the new highway building program, which will result in construction of about 41,000 miles of interstate superhighways, to cost around $100,000,000,000 in ten years—the largest governmental construction program in world history.

Diesel Sales for Highway Transportation

Year	*Truck*	*Bus*	*Total*
1957 Est.	26,000	4000	30,000
1956 Est.	21,000	3800	24,800
1955	16,876	3333	20,209
1954	10,540	2732	13,272
1953	13,584	2806	16,390
1952	14,689	3157	17,846

Marine

Considerable strength exists in this market, and it is likely to grow stronger in 1957. About as much tonnage was ordered built to American Bureau of Shipping classification during the first six months of 1956 as was ordered during the entire year 1955.

Total applications in the first half covered 2,382,385 tons, compared with an aggregate of 2,964,799 tons received in 1955, the new contracts covering 386,490 tons to be constructed in the U. S. and 1,995,895 tons abroad. Actually, orders from abroad represent 87% of the total new business booked, and included were the two largest cargo carriers in the world.

Inland waterways are doing a booming business, in line with their growing importance. In approximately the last two decades tonnage carried on U. S. rivers and connecting channels has gained almost 1000%. Barges now haul about 8% of all freight traffic. Traffic on the Mississippi alone since World War II has jumped by more than 400%. Traffic in 1956 is about 10% over 1955, the previous record year.

The market for diesels is excellent in these fields as well as in fishing fleets, offshore drilling and other smaller vessels. Small freighters and tankers for operation on the improved St. Lawrence Seaway build up the potential also.

Diesel Sales in the Marine Field

Year	*Vessels Over 100 Gross Tons*	*Diesels for Smaller Vessels*	*Totals*
1957 Est.	210	2560	2770
1956 Est.	175	2520	2695
1955	90	2319	2409
1954	96	2225	2321
1953	126	2119	2245
1952	114	1966	2080

Municipal and Utility

Fast-rising population, increasing at the rate of about 3,000,000 a year, intensification of moves to the suburbs and the need for more power in the trend to better living, make a strong base for diesel engine sales.

On this base, the municipal market potential is expanding, while record-breaking prosperity entails tax revenues facilitating such expansion. Some projects are on a pay-as-you-go basis, representing further stimulation.

Besides electric power generation, municipalities use diesels, dual-fuel, and gas engines for miscellaneous other purposes, such as sanitary systems, drainage pumping, sewage and refuse disposal, and powering water system pumps.

Expenditures by public utilities for expansion of new plant and equipment in 1955 totaled $4,309,000,000, and for the full year 1956 the final estimate is $4,968,000,000, a gain of 15%. The 1957 prospect indicates another fine gain—up to $5,460,000,000. Some of these expenditures, of course, are for buying diesel engines for such uses as peaking, end-of-the-line, emergency and standby service. Evidently, there is a strong foundation for sales expansion in this industry.

Installation of diesel engines follow:

Municipal and Utility

Year	*Installations*
1957 Est.	447
1956 Est.	440
1955	431
1954	425
1953	392
1952	355

General Industry

This division uses diesels in a wide range—from the big engines found in ore reduction and metal fabricating plants to the small emergency standby units.

Large rate of expansion in spending for new plant and equipment took place in 1956, and substantially higher spending is visualized in 1957. Thus, final estimates for 1956 show that such expenditures rose in the Iron & Steel Industry to $1,575,000,000, compared with $879,000,000 in 1955, Nonferrous Metals went up to $653,000,000 from $293,000,000, Machinery to $1,092,000,000 from $809,000,000, Autos to $2,000,000,000 from $1,128,000,000, Transportation Equipment including aircraft to $397,000,000 from $274,000,000, Chemicals to $1,400,000,000 from $1,016,000,000, Paper to $940,000,000 from $518,000,000, Rubber to $224,000,000 from $150,000,000, Stone, Clay & Glass to $706,000,000 from $498,000,000, Petroleum Refining & Chemical to $810,000,000 from $704,000,000, Foods & Beverages to $802,000,000 from $718,000,000, Textiles to $381,000,000 from $366,000,000, and Mining to $430,000,000 from $318,000,000.

While there is no direct correlation between these figures and engine sales, the sales psychology behind this strong rate of expansion distinctly indicates greater diesel engine purchasing potentials. The year 1957 is expected to be better than 1956:

General Industry

Year	*Engines*
1957 Est.	16,700
1956 Est.	13,500
1955	12,800
1954	11,200
1953	15,780
1952	12,987

Petroleum

Record-breaking numbers of cars on the road, new highs in totals of trucks, tractors, road building machinery, mining machinery, oil heating machinery, and the prospect of further expansion of these totals point to an assured, progressive future for the petroleum industry. Actually, the diesel engine's stake in the petroleum industry is a double one, inasmuch as diesels represent a principal market for its output and they also are being used in ever greater amount for petroleum production and distribution.

Essentiality of the petroleum industry is indicated in the fact that the government has granted certificates of necessity to it for over a billion dollars in fast-write-off construction. Its plans for expenditures in new plants and equipment indicate this is a fine market for diesel engine sales expansion. In the production end of petroleum actual expenditures totaled $3,630,000,000 in 1955, compared with estimated $3,990,000,000 in 1956 and $4,150,000,000 in 1957. In refining, the totals are $704,000,000 in 1955, $810,000,000 in 1956 and $1,000,000,000 in 1957, and in transportation it runs $249,000,000 for 1955, $290,000,000 for 1956 and $300,000,000 for 1957. Ingenious selling, therefore, should produce good results in this market in 1957.

Petroleum

Year	*Engines*
1957 Est.	6620
1956 Est.	5075
1955	4630
1954	4310
1953	4280
1952	4164

Mining

This huge, basic industry is essential to the economic growth of the country, and its need for diesel engines must expand substantially in the future.

Reflecting the nation's needs for raw material and fuel, as well as a large export demand, final estimates for spending on new plant and equipment by the mining industry in 1956 are $220,000,000 for coal, compared with $147,000,000 in 1955. For the iron ore division, such spending is estimated at $40,000,000 for the full year 1956, compared with $27,000,000 for 1955. In the nonferrous division of mining, expenditures are estimated at $105,000,000 for the full year 1956, compared with $94,000,000 in 1955. In the non-metallic division, it runs $64,000,000 estimated for 1956, compared with $50,000,000 for 1955.

Continuing to be heavily stimulating, uranium mining is an attractive market for diesels, especially since much of this is in isolated locations, and the engines are essential for ventilation, pumping, drilling and hauling. Essentiality of the entire mining industry is acknowledged by the government in the fact that over $1,500,000,000 of expansion is certified in Washington in certificates of necessity for fast write-off. Potential demand for diesel engines is excellent in this field.

Mining

Year	*Engines*
1957 Est.	4010
1956 Est.	3925
1955	3468
1954	2953
1953	2635
1952	1950

Construction

This industry is currently the brightest spot in the economic picture, despite the drag of somewhat lower private residential construction.

Full year totals for construction are estimated at $45,000,000,000 for 1956, which would compare with $43,000,000,000 for 1955 and $37,800,000,000 for 1954. Big stimulus comes from expenditures for new plant and equipment, which in the third quarter of 1956 was running at the annual rate of $37,000,000,000, compared with $29,650,000,000 in the third quarter of 1955.

Heavy stimulus will come in the future—as indicated in the section under Highway Transportation — from the gigantic road-building program, which is the largest Federal works program in history and is likely to bring expenditures in its various ramifications to about $100,000,000,000 in the next ten years. Highway equipment manufacturers, now doing total business of about $2,000,000,000 annually, are likely to treble their business as a result of the highway program within this ten-year period.

All phases of heavy duty construction face a strong prospect, with corresponding benefits likely to diesel engine producers.

Construction

Year	*Engines*
1957 Est.	52,500
1956 Est.	38,150
1955	28,700
1954	26,200
1953	28,400
1952	25,286

Agriculture

Commodity surpluses and declining farm income have lowered farmers' purchasing power in recent years, but improvement now is definitely indicated. Prices received by farmers rose about 10% through most of 1956. There were gains of 17% for crops and 6% for livestock. Farm income grew to a favorable rate of $11,600,000,000 in the first half of 1956, a half billion above the rate in the last half of 1955, and current income will benefit under the soil-bank program. Exports of farm products have been heavy and domestic demand is being strengthened by record-high total U. S. incomes.

Farm equipment dealer inventories now are generally below what they were a year ago. Some manufacturers have liberalized credit, and this should have a beneficial effect on sales. A year of rising prices has eased the cost-price squeeze in which the farmer finds himself, and his future looks brighter than for several years. Actually, the farmer's financial condition has been strong, and even income—figured per-capita-wise—does not look bad in perspective. A greater effort to improve the farmer's situation is likely to be made in the future by both major political parties, and the net result can scarcely be anything but higher purchasing power and therefore an expansion of the agricultural diesel market potential.

Agriculture

Year	*Engines*
1957 Est.	35,000
1956 Est.	32,800
1955	39,300
1954	43,307
1953	58,158
1952	68,327

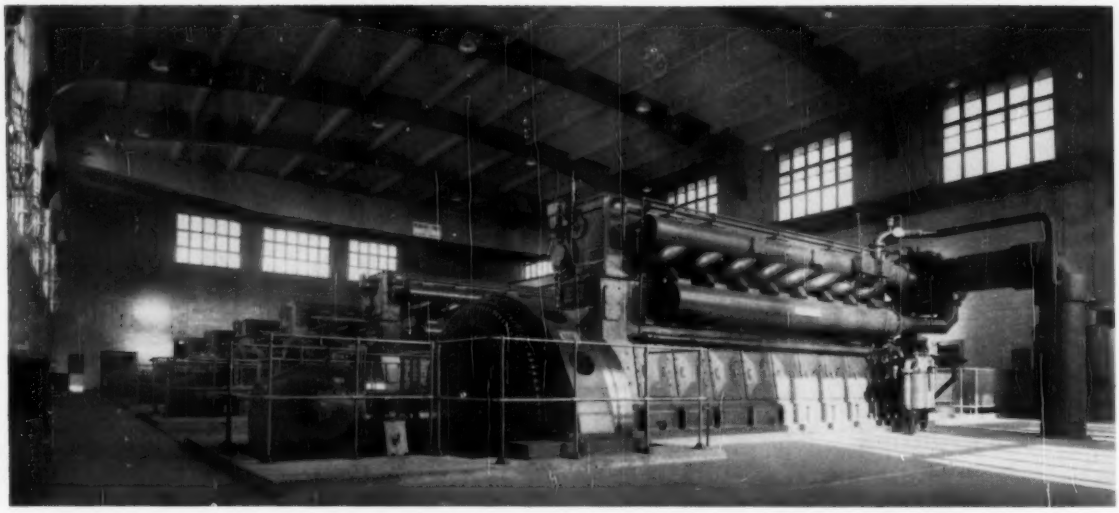
Totals by Years

	1957 *Estimated*	1956 *Estimated*	1955	1954	1953	1952
Railroads	1,625	1,625	1,200	1,140	2,201	3,140
Highway Transportation	30,000	24,800	20,209	13,272	16,390	17,846
Marine	2,770	2,695	2,409	2,321	2,245	2,080
Municipal & Utility	447	440	431	425	392	355
General Industry	16,700	13,500	12,800	11,200	15,780	12,987
Petroleum	6,620	5,075	4,630	4,310	4,280	4,164
Mining	4,010	3,925	3,468	2,953	2,635	1,950
Construction	52,500	38,150	29,700	26,200	28,400	25,286
Agriculture	35,000	32,800	39,300	43,307	58,158	68,327
TOTALS	149,672	123,010	114,147	105,128	130,481	136,135

NOTE: Figures are estimated sales of all sizes and types of diesel, dual fuel, and gas burning engines.

Some Horsepower Estimates

		1957 *Projected Engines*	*Estimated Horsepower*
Railroads			
Horsepower Range 200-2400	Estimated Average 1200 H.P.	1,625	1,950,000
Highway Transportation			
Horsepower Range 120-200	Estimated Average 140 H.P.	30,000	4,200,000
Marine			
Horsepower Range 165-4800	Estimated Average 400 H.P.	2,770	1,108,000
Municipal & Utility			
Horsepower Range 200-3600	Estimated Average 1250 H.P.	447	558,730
General Industry			
Horsepower Range 60-3600	Estimated Average 300 H.P.	16,700	5,010,000
Petroleum			
Horsepower Range 60-2400	Estimated Average 300 H.P.	6,620	1,986,000
Mining			
Horsepower Range 60-550	Estimated Average 150 H.P.	4,010	601,500
Construction			
Horsepower Range 60-550	Estimated Average 150 H.P.	52,500	7,875,000
Agriculture			
Horsepower Range 30-180	Estimated Average 75 H.P.	35,000	2,625,000
		149,672	25,914,230



Waste digester gas makes possible the use of these six Superior turbocharged dual-fuel engines. They are the only source of power at the Owls Head Sewage Treatment Plant in NYC. The 8-cyl engines, rated 1300-hp are direct connected to 900-kw alternators.

Dual-Fuel Engines Cut Sewage Plant Costs

Operating report of N. Y. City's Owl's Head Sewage Treatment Plant shows practicality and economy of using dual-fuel engines, burning waste digester gas, for power needs.

DUAL-FUEL engines burning waste sewage gas are saving New York City $61,667 annually. This is being accomplished at the Owl's Head Sewage Treatment Plant where they're generating their own electricity instead of buying it.

In addition, they're saving $36 per day during cold weather by using the heat extracted from the engine cooling water and exhaust waste-heat boilers. These two heat sources provide about 60% of the winter requirements for building and digester heating.

Here again, good planning and the engineers' ingenuity has paid off. By using every available Btu—especially those generally wasted—plant operational expenses have been kept to a minimum resulting in lower taxes and other related benefits. This is another example of a very effective way used by many municipalities to get economy operation.

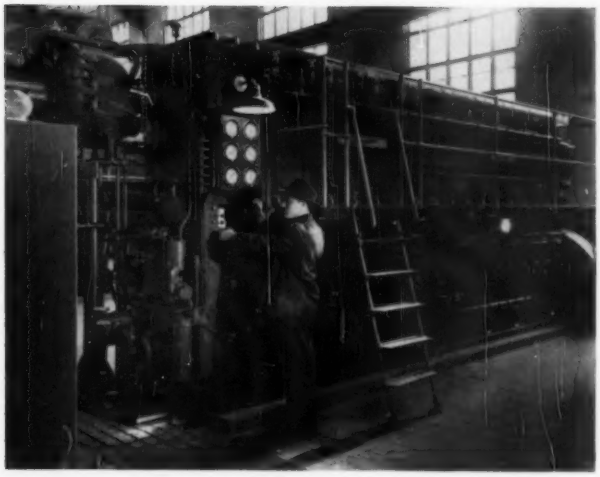
According to a report submitted by Mr. N. I. Kass, chief of NYC's Bureau of Sewage Disposal Operations, and F.H.A. Lino, Supt. of the Owls Head Plant, the cost difference between purchased-power and gas-generated power is $0.0041 per kwh. This gives an average saving of about $62,000 per year.

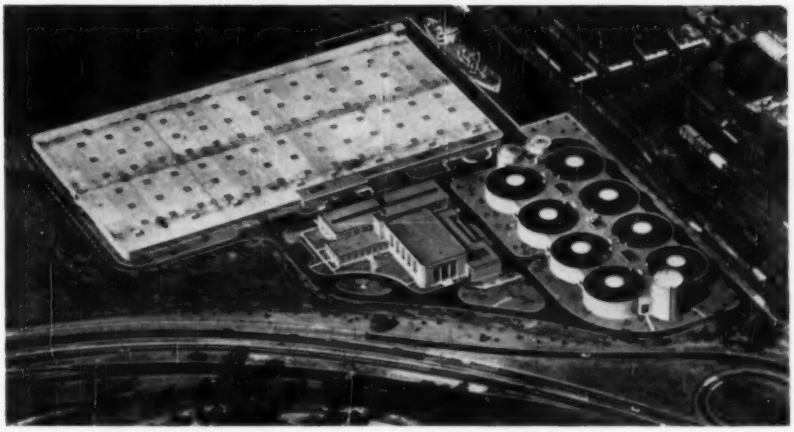
These savings are possible only because the six Superior dual-fuel engines driving the generators can burn the digester gas produced from the high-rate activated sludge. These 8-cyl, 14½-in. bore, 20-in. stroke engines are made by the White Diesel Engine Div. of the White Motor Co. They're rated 1300-hp and are direct-connected to 1124-kva, 4160-v, 900-kw alternators with direct connected exciters.

These units are able to meet the full-load plant requirements even though it operates completely independant from any outside power source. No provision has even been made for outside stand-by power for emergency operation of plant equipment, all of which is motor-driven.

Plant policy is to operate the Superior units at about 80% capacity, and combine as many units as needed to do this. But the engines are designed for 10% overload for short periods. For dry weather flow averaging 85-mgd, three generator sets are used in parallel from 8 a.m. to midnight, then one is cut out. During rain storms an ad-

This Superior engine has been started on diesel fuel and is being thrown over to automatic dual-fuel operation by pressing a push button. Daily fuel consumption during dual-fuel operation averages 380 gallons.





Air view of Owls Head Plant shows how close it is located to the Belt Parkway in Brooklyn, NYC, and a residential section. Yet, the high-rate activated sludge process used gives off no bad odors and does not affect the surrounding community in any way except to reduce sea-water pollution. A sludge vessel for deep-sea disposal of spent sludge is seen at the dock preparing for loading.

ditional unit is necessary for the added pumping load. Normal daily full-load (dry weather) demands range from 2250-kw to 1200-kw after midnight. The demand peak may reach 3000-kw during rain storms.

According to the report, no difficulty has been experienced in parallel operation even when as many as five units were on the line at the same time during test runs. Since the plant went into operation in February 1952 (See DIESEL POWER, March 1952), until December 31, 1955, the engines have been on the line for a combined total of over 91,000 hours. During this period emergency shutdowns have been negligible.

When the engines were first put on the line they were operated as deisels. Later, about the middle of April, 1952, digester gas became available and adjustments for dual-fuel operation were made on the engines. About 930,000,000-cu ft of gas having 650-Btu per cu ft were used from April, 1952 to the end of 1955.

Fuel costs during the first three years of dual-fuel operation averaged $0.0009 per kwh. Daily fuel oil consumption is 380 gallons. During this period, a total of 46,100,000-kwh was generated or about 42,000-kwh per day. Based on prevailing utility rates, and on an average monthly consumption of 1,260,000-kwh, and a 2700-kw demand, outside power would cost NYC $0.0137 per kwh.

Maintenance costs for these units is also reported as being low. For example, at a scheduled inspection after 12,000-hr of operation, every wear-point on the engine was checked. The report states that wear was far less than expected. Piston rings were renewed only to prevent possible excessive lube oil consumption before the next scheduled 12,000-hr inspection. But they were still in such good condition that they were placed in stock as spares.

The report concludes that selection of dual-fuel units in preference to utility power at the Owl's Head plant has been well justified. NYC has proven that surrounding sea-water pollution has been considerably reduced by the high-rate activated sludge process.

In addition, a byproduct of this process, the digester gas, makes possible the use of dual-fuel engines, and furnishes a no-cost fuel which considerably lowers overall plant operational costs.

This Ellicott 10-in. portable dredge is excavating a swamp area on route of new Greenwich-Killingly Expressway. Fill material dredged out will be pumped into a retaining area for further use on new highway.

Hydraulic Dredges as Earthmovers

Small enough to be portable, diesel-powered dredges qualify as construction machinery for road building, land excavation and fills, and similar projects in areas where heavy machinery flotation is a problem.

YOU have a contract to build a section of new highway. Part of the right-of-way is through a swamp. You can't build a stable roadbed on muck and silt so it has to be excavated and replaced with stable fill.

Normal cut and fill operations won't apply here; there is the problem of flotation for heavy machinery. You could push out, bridge-building fashion, from stable ground, supporting the clamshell or dragline on newly-placed fill. But inching along, first excavating and then filling, plus the handling of the materials in the limited access area, makes for slow progress and runs up costs.

Here's the spot for a hydraulic pipe line dredge or perhaps more aptly phrased, a "floating excavator". Not only do they excavate but they move their own material. Dredges are nothing new but their application for this type of work is growing. One reason is that standardized units are being built in small sizes and for maximum portability.

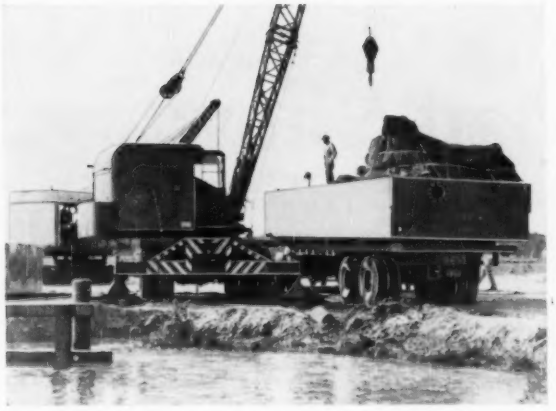
Some units are small enough to be moved essentially intact on flat-bed trailers. Larger ones are sectionally designed in match-marked parts for easy transportation and erection on the site. Very little water is needed for flotation and landlocked areas are no problem. The high degree of mobility means higher utilization as rigs are moved rapidly from job to job.

Let's look at one application. The route of the new Greenwich-Killingly Expressway in Connecticut included building part of the road through a swamp. The contractor solved the problem by use of a 10-in. (diameter of discharge pipe) pipe line dredge, D. C. Locke, owned and operated by the New England Dredge and Dock Company of New Haven.

The first dredging site was some 200 feet from the main line of the New Haven Railroad. Parts of the 44-ft long, 18-ft wide by 5-ft deep welded-steel dredge were shipped in by rail and assembled on the spot. The machine is capable of digging to a 20-ft depth with an estimated output of 170-cu yd per hr of waterbound solids. And it transports the material through about an 1100-ft discharge pipe with a terminal elevation of five feet.

This particular dredge was one of the so-called "Dragon" models built by Ellicott Machine Corp., Baltimore, Md. The centrifugal suction pump is driven through a reduction gear by a 250-hp GM diesel. A similar but smaller unit provides power for hauling and hoisting machinery and the cutter.

Ellicott, specialists in dredges and dredging machinery, build this versatile model in 8-in., 10-in. and 12-in. sizes. Rates for moving dredged solids range up to 250-cu ft per hr and to distances up to 3000-ft. or more.



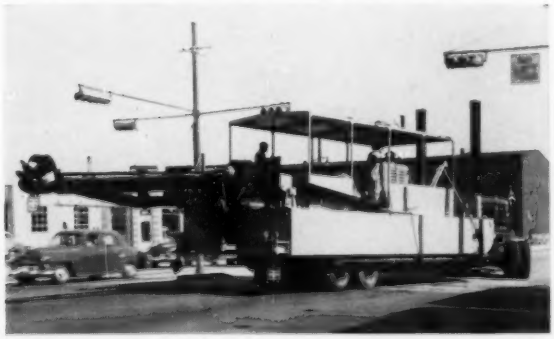
Here's an example of how a portable dredge is shipped in sections. The center hull section and machinery can be seen on truck. After crane unloads it, it will be assembled with other sections.

Another series of "Dragon" models, called canal dredges are built in 6-in., 8-in., 10-in. and 12-in. sizes. They are narrower, shallower and more maneuverable. Operation is somewhat different from the other series, fitting them for many specialized earthmoving jobs.

Operation of the larger models is conventional. The ladder is fixed, moving only in a vertical plane. Stern spuds are provided as a pivot for swing cuts and for fleeting. In the canal dredges, front and rear spuds anchor the dredge and the ladder swings horizontally as well as moving vertically. As a result, the dredge can cut a canal for irrigation, drainage, etc., only a little wider than the dredge hull.

The versatility and easy portability of modern small dredges makes them adaptable for any number of earthmoving projects. They can pump and place construction aggregates, excavate or fill, cut canals and do a 101 other jobs that would otherwise be knotty construction problems. And while inherently economic earthmovers, diesel power provides reliability and insures lowest cost per yard of material moved.

This latest design canal dredge is seen on a flat bed truck being transported in one piece to dredging site. Dredge has complete deck house on it and merely has to be connected up at the site.



Diesel Specialists Form Association

From North, South, East, West and points in between, a group of injection equipment and governor specialists congregated in Chicago. Their purpose—to found an association to represent their interests.

This is to be an association organized under New York State Corporate Laws and operating throughout the country. At the first meeting in November, 1956, organization started with representatives of some 13 shops present. Representatives of three injection equipment and two governor manufacturers were also there.

Officers elected were: President—H. E. Wittersheim, Diesel Injection Sales and Service, Norfolk, Va.; Vice-President—M. A. Gerhardt, Gerhardt's Inc., New Orleans, La.; Secretary—S. E. Franklin, Diesel Control Corp., Wilmington, Calif. Treasurer—V. J. D'Aversa, A & D Diesel Service, Inc., Brooklyn, N. Y.

Objectives of the association show in some of its standing committees. Take the Standards Committee: its purpose is to investigate products not in general distribution. Here's a real service to cut down chance-taking without missing a good bet.

Then there is the Service Information Committee. How about that? A chance to dig into collective service experience to solve that tough problem! This has been needed for a long time.

A Program Committee will arrange both technical and business sessions of specific interest to the membership. This permits a concentration not possible in programs of other groups.

Representatives of manufacturers were helpful and encouraging. They indicated willingness to cooperate by supplying technical aid and service data. Closer contact will result in better understanding of mutual problems.

A final comment on objectives is found in the membership eligibility requirements. Adequacy of equipment and work quality are mentioned. Also, firms must use "Manufacturers' approved methods and specifications exercising business ethics compatable with the best interests of the Diesel Engine Industry."

In short, this is a move to raise standards in this field and to make procedures, both technically and business-wise, more uniform. It should help everyone; "ADS" could well become a "stamp of approval."

Another meeting is planned and organization is progressing. If you want more details, drop DIESEL POWER a card.

ARBA's Road Show

From January 28 to February 2, 1957, Chicago's International Amphitheatre will be the "show case" of this country's construction machinery. The event is more important than ever with passage of the Highway act of 1956. Here is a preview showing some trends in today's diesel-powered equipment.

HOW do you report something as big as ARBA's Road Show? Even when you see it, it will take some time to digest it all. We've tried to help by pre-digesting parts of it to determine trends and things to look for in this modern machinery.

It's not just one show; there are shows within shows. An array of the big earthmovers is backed up by a full range of smaller units. You can pick the right size for every job.

Other essential equipment—from crushers and pavers to drill wagons and dewatering-systems will also be shown.

Engines to power all this equipment and drive-line components to transmit the power efficiently will be displayed. Then there are the components of these components—filters, fittings, hoses, etc.

Finally there are the suppliers to the construction industry. These range from concrete and bituminous materials to drainage pipe.

All in all there will be enough equipment displayed to fill 12 football fields! And the bulk of the machinery is diesel powered.

Some General Impressions

ON "NEWNESS"—You'll hear a lot of the word "new". Manufacturers have anticipated expanded construction volumes with the result that today's contractor has the biggest selection of the best construction machinery ever produced.

The Road Show has been selected by many as a kick-off for brand new models. Minneapolis-Moline, diversifying their line of industrial and farm machinery, is showing a completely new crawler tractor.

Clark has expanded their Tractor Shovel line and added Tractor Scrapers and Tractor Dozers. Practically everyone has a new model or two.

Existing models are "new" in the sense that they have new ratings and embody all the latest design features. Some, such as International Harvester's Payhaulers and Payscrapers, were recently introduced.

These I-H Payhauler 95's average 23.49-cu yd or 61,074-lb of limestone per load on a Missouri road cut. The 335-hp Cummins Turbodiesel provides power for a round trip of 1680-ft at an average time of two minutes, 45 seconds per trip. Grades average 23%.

This is Mack's 34-ton dumper with 400-hp driving through single-stage torque converter and 4-speed over-gear transmission. This vehicle, largest at the recent National Automobile Show, is shown in contrast to smallest, a battery-powered "Thunderbird, Jr.".

Euclid's R-40 (40-ton) replaces their former 34-ton model and will be shown for the first time. It's powered by two 235-hp turbocharged GM engines or two 250-hp Cummins Turbodiesels.

Clark's "Michigan" line Tractor, Scrapers and Tractor Dozers will be shown for first time. This Model 110 (8 to 10½-yd) is smallest of three with capacities up to 27 yd. All have power shifting.

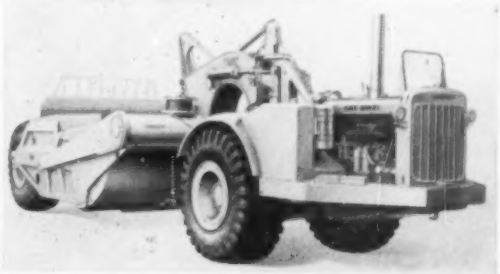
Euclid's S-18 overhung scraper and rear dump show trend toward interchangeability. Semi-trailer dump body interchanges with scraper bowl. The S-12 becomes 13-yd bottom dump.

On "SIZE"—On the basis of capacity, all machines are bigger. Larger dozers, scrapers and dump trucks are pushing up to new capacities and smaller units are approaching former capacities of the next largest size. To give an example in the tractor shovel category, Allis-Chalmer's Buda-powered HD-21 with 204 net-hp is now fitted with a 4-yd tractor shovel. Clark's Michigan rubber-tired Tractor Shovel is up to 6-yd capacity.

ON "POWER"—Power is up across the board with more turbocharged engines in evidence. Big unit powers are climbing. Euclid's TS-24 scraper has 300 hp in front and 218 hp pushing; Cat's D9 dozer has 320 hp at the flywheel; Mack's 34-ton dumper has 400 hp.

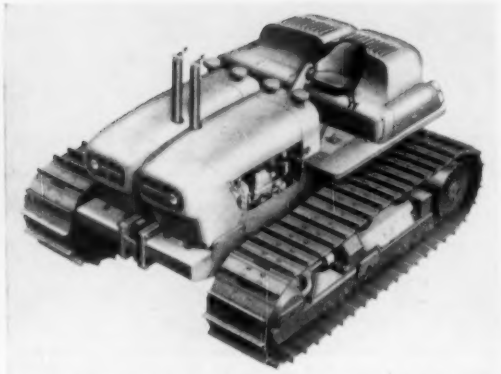
To show what's going on in smaller units, International Harvester has boosted power on their TD-14 dozer 12½% to 78.5 net-hp; the TD-9, 32% to 54.5 hp; and the TD-6 20% to 41.5 hp. Larger models also show increases. All this power is used in two ways: to handle capacity increases and to speed work cycles.

Cat's 25-yd, heaped, Lowbowl scraper is behind 300-hp, DW21 tractor. Tractor's also used with Athey rear dump PR21 wagon.



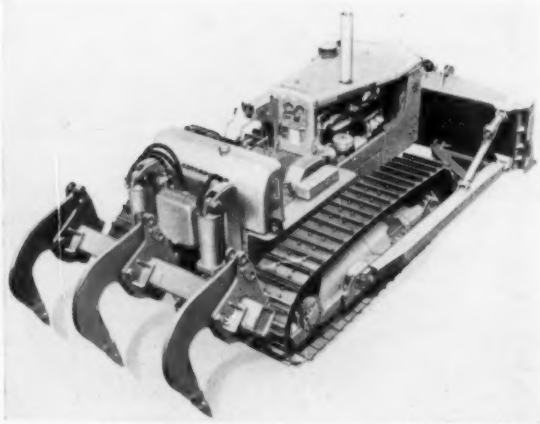
These I-H Model 75, 20-yd Payscrapers shifted 92,000-cu yd in 22 hours. The 262-hp scraper is being push-loaded by 200 net-hp TD-24.

Euclid's TS-24 scraper does own push-loading—300-hp diesel in overhung tractor and 218-hp engine at rear, power through 3-speed Allison Torqmatic Drives. All shifting is made hydraulically.



Each track of Euclid's TC-12 is driven by a 218-hp GM 6-71 through Allison torque converter and semi-automatic transmission. This permits pivot turns with one track in forward, one in reverse.

Allis-Chalmer's Buda-powered HD-21 with torque converter drive has gross 235-hp output at rated speed and maximum drawbar pull of 65,000-lb. One attachment switches this unit to tractor shovel.



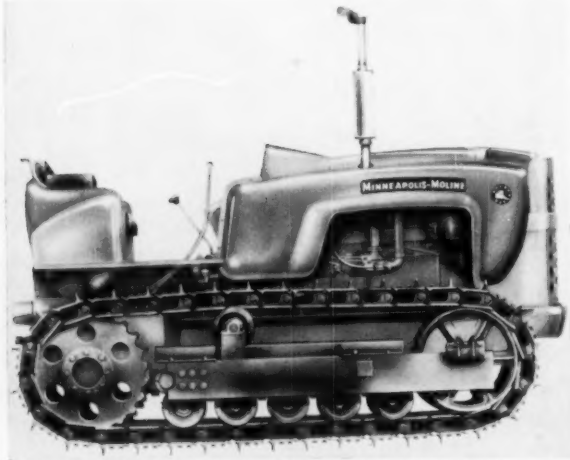
Versatility of Cat's turbocharged D9, now with 320 flywheel-hp, is increased with mounting of No. 9 hydraulically-controlled ripper.

On "Handling"—Ease of control and maneuverability have gotten a big play. Power-steering is practically standard for big dumpers; hydraulic actuation of steering clutches, on big dozers. Euclid's TC-12, has each track driven by a separate engine through Allison's Torqmatic drive and no clutches are needed. Shifting under power requires only movement of a selector lever.

LeTourneau-Westinghouse goes further. With their exclusive electric system, practically all working functions including steering are electrically operated.

With the limitations of work sites and haul roads in mind, maneuverability has been stressed. Typical is Clark's 10½-yd Model 110 Michigan scraper. Full 90-deg steering in either direction is provided and a 180-deg turn can be made on a 30-ft roadbed.

On "Comfort"—Operators are getting a break. Seats are more comfortable, visibility is improved. Controls are better arranged and simplified. The bull-work of operation is reduced by hydraulic assists, fingertip shifting, and reduction in the number of operations. An example of the



Minneapolis-Moline introduces their "Golden Kat" model in the 57-bhp class. Diesel or gasoline engines are optional. Torque converter and 5-speed transmission work with reverse shuttle gear.

I-H's Drott 4-in-1 is seen as dozer. It can switch to skid-shovel, clam-shell or bull-clam operation. Ability to do this means higher utilization and typifies this trend in today's machinery.

Clark's "Michigan" tractor shovel scoops 6 yd on each pass. Torque converter and power-shift transmission speed cycles while power steering aids maneuverability. By attaching a low swinging drawbar to the tractor it is made fit for use in other applications.

I-H's Payloader has 77-hp engine driving through converter and power-shift transmission and power steering. It lifts 1¾ yards to a 9-ft discharge height. One of its maintenance features is a chassis which tips up to expose the main frame deck.

latter is the use of torque converters that reduce the shift steps necessary.

ON "DRIVE LINES"—There is a wide choice of driveline components even in the same machine. You can get torque converter-drive with power-shifting or some new greatly improved clutch and step-gear drives. For example, you can have I-H's big TD-24 dozer either way.

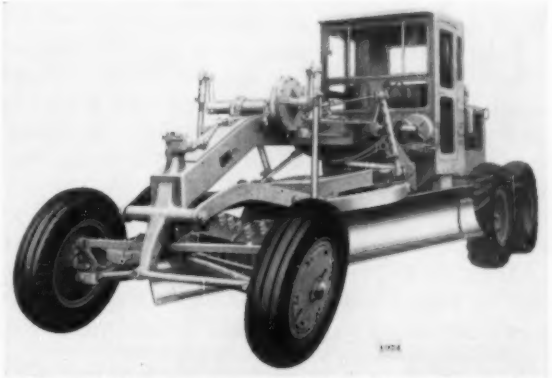
Practically all units feature positive drive on both sides, driver wheels or tracks. "No-spin" differentials or similar power dividers are used with single engine drives. This is automatically provided on twin drives such as used by Euclid.

Clark's expanded Michigan line emphasizes the importance placed on the drive line. They took the basic design of matched power-shift transmissions, torque converters and planetary-wheel axles, developed for the Michigan tractor shovel and extended its application to their new line of scrapers and dozers. A high degree of parts interchangeability—substantially lowering parts inventories needed—resulted.

ON "VERSATILITY"—High utility means fast amortization of equipment and today's equipment builders are out to see that equipment is kept busy. Tractors, both tracklaying and wheel-type, are basic units on which to mount attachments. Rippers, pull stumpers, back hoes, rock rakes, winches and booms, pushcups, and adjustable dozer blades (some from the driver's seat) are a few items.

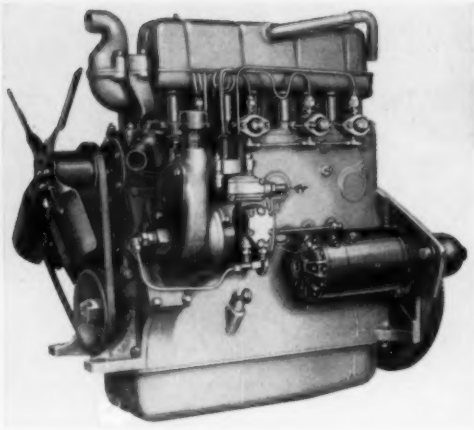
Versatility of front end loaders is illustrated by the International Drott TD-18 3-yd skid shovel that converts to a clamshell, a bullclam or bulldozer. Cat's Traxcavators have either front or side dump buckets.

Many lines in the scraper category feature interchangeability of scraper bowls and dump bodies. LeTourneau-Westinghouse extends this idea with a single Tournapull prime mover that can be used with a half dozen matched working tools.



Caterpillar's No. 12 motor grader features the new Preco automatic blade control for precision grading. This maintains blade angle automatically. It also has hydraulic moldboard control.

Allis-Chalmer's Model 45 motor grader is seen shaping a road shoulder. In addition to the tractors, Allis-Chalmer will also show their power scrapers and power dump wagons.



Continental's Model ED 201 at left is rated 45.8-hp at 2000-rpm. It's torque is 145.2-lb ft at speed of 1100-rpm.

At right is seen the latest addition to Cummins' Turbodiesels. This is the 335-hp Model NRTO-6 which has 743-cu in. displacement.

What Engine Builders are Showing

Today's diesels will be seen both in and out of the construction machinery. There are displays of the latest models used as original engines in the construction equipment or available for re-engining projects. Also, power units for all types and sizes of jobs will be shown. Here are highlights of engine displays.

CONTINENTAL—"Interchangeability" will be stressed in Continental's Red Seal engine line which includes more than 100 basic models. Over 2000 different specifications are available to suit the performance characteristics, shape, weight and profile needed for each job.

Wide interchangeability of parts exists within the diesel line and this extends even to some gasoline models. Incidently, ten different diesel series are completely interchangeable in their mounting pattern with corresponding engines in the gasoline line. Re-engining is thus simplified.

All Continental engines feature "Cushioned Power". Their combustion system combines a turbulence chamber and an energy cell that effectively reduce peak firing pressures and prolongs fuel burning over a greater portion of the power stroke.

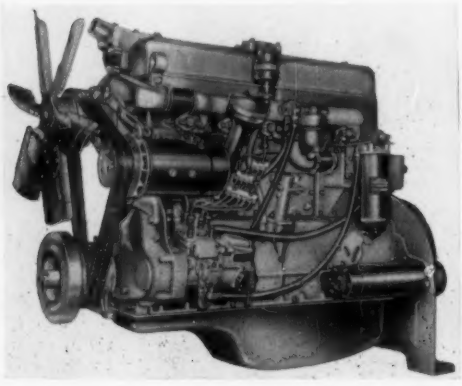
CUMMINS—Of eight engines shown by Cummins, three will be new models. Also, over 20 manufacturers will show Cummins-powered equipment.

New models are: an 8-cyl, vee-type, 5-in. by 5-in., 375-hp turbocharged engine with 783-cu in. displacement; a 4-cyl, 4⅛-in. by 5-in. 60-hp naturally-aspirated engine of the "J" series with a 267-cu in. displacement; and a 375-hp NFT-6 Turbodiesel with a 5⅛-in. bore, 6-in. stroke and 743-cu in. displacement.

Cutaway models will include the 335-hp NRTO-6 and the 600-hp VT-12 Turbodiesels. All the Turbodiesels feature Cummins' own turbocharger. Other units shown include: an NRT-6-powered 100-kw generator set; a JIPS-600 torque converter unit; and a JN-6-IP pumping unit.

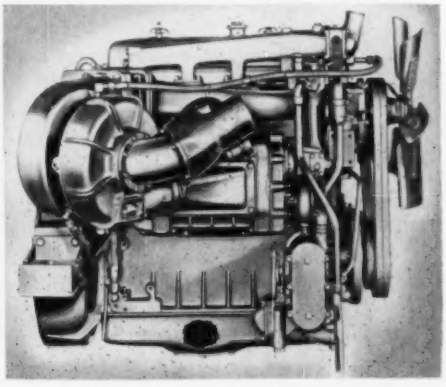
DETROIT DIESEL—This Division of GM will show eight engine models ranging from 95 to 300 basic horsepower. It will be the first public showing of the new Series 71 Turbopower units and the newly-designed 6-110 Roots blower engine. Also shown will be GM torque converter and Hydrostarter models and a 125-kw generator set.

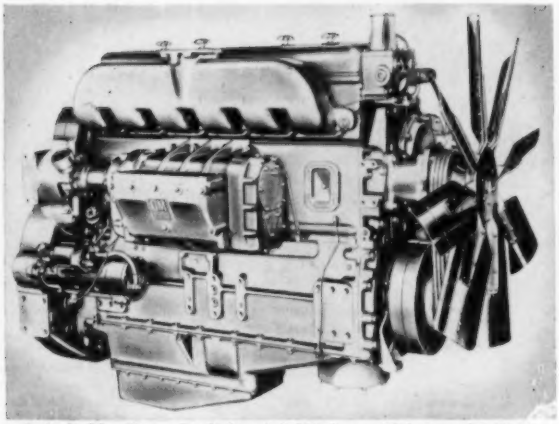
Turbopower engines have both turbocharger and blower for air supply to the cylinders. While blower output is



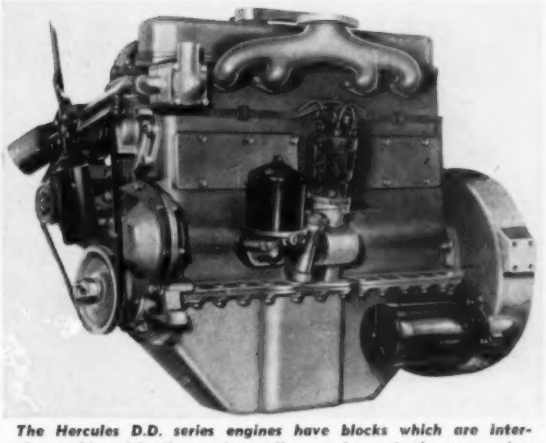
At left you can see the Continental Model RD 572 rated 154-hp at 2000-rpm. Torque is 428-lb ft at 1300-rpm.

At right is Detroit Diesel's 4-cyl, Series 71 Turbopower unit which is rated at 171-bhp.





Detroit Diesel's newly designed 6-110 has a high capacity Roots blower which makes this 300-hp 6-cyl model a more compact unit.



The Hercules D.D. series engines have blocks which are interchangeable with those of gasoline engines of the same size.

responsive to speed, the turbocharger is responsive to load. The combination results in more air and better air-fuel ratios throughout the operating range. The result is increased efficiency approximately equal to a 17% increase in horsepower or a 15% decrease in fuel consumption over corresponding Series 71 models. Basic ratings are 171- and 236-hp for the 4- and 6-cyl models.

The new 6-110 is equipped with a high-capacity blower similar to those on Series 71 engines that replaces the earlier centrifugal model. Important improvements include reductions in engine height and length, additional free space for accessory drives and increased air supply for improved performance in low-speed ranges. Basic rating is 300 horsepower.

HARNISCHFEGER—Along with a new 40-ton truck crane, and other machinery Harnischfeger will show their engines. These supply both "upper" and "lower" power for the new unit as well as their other products.

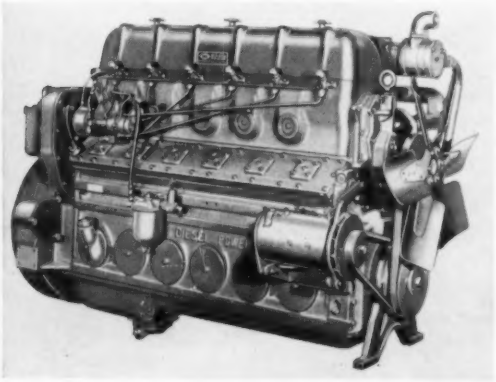
P & H diesels recently went through extensive design improvement resulting in much higher ratings. This also improved the weight to horsepower ratio. The injection system was much simplified by adoption of the Roosa-Master fuel injection pump. Their 3-cyl model is now rated 105-hp at 1800-rpm and the 6-cyl unit, 205-hp at 1800-rpm. The 3-cyl unit weighs 1300 lb; the 6-cyl unit, 1900 lb.

HERCULES—They will feature their interchangeable line of diesel and gasoline engines. For all practical purposes they are the same engine with most component parts the same in both diesel and gasoline executions. Heads and pistons are modified in the diesel for compression ignition. Fuel-handling equipment differs and the gasoline engines have ignition harness.

These engines will be shown in 3, 4 and 5-cyl versions. Eighteen different bore sizes are available. Diesel models are known as the D.D. series.

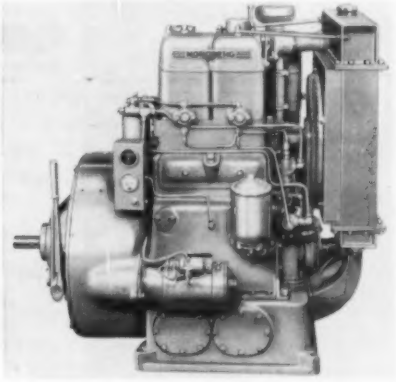
Also featured are new and modern-design power units. These have been reproportioned to accommodate the D.D. engines as well as the regular turbulence-chamber diesels in the Hercules line. The 25 models exhibited (some gasoline) will be representative of Hercules' more than 90 models. They range from 2 to 8 cylinders and from 3 to 500 horsepower.

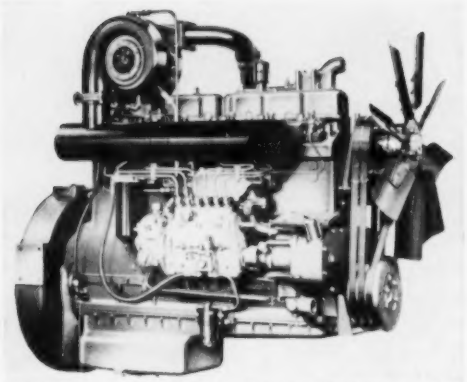
NORDBERG—In addition to their line of crushers, screens, etc., Nordberg will show their Power Chief engines. Built in 1-, 2-and 3-cyl models with a 10-45-hp range, they have wide application in the construction field. As generator sets they are rated 5 to 30 kw.



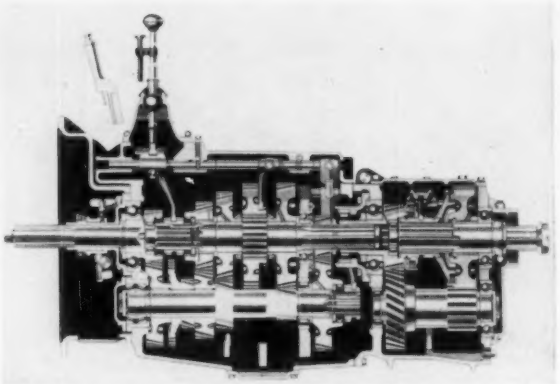
This Harnischfeger Model 687C-18 at left is rated 205-hp at 1800-rpm. It's total weight is 1900-lb.

Nordberg's Power Chief engines are built in 1-, 2-, and 3-cyl models rated from 10 to 45 horsepower.





Waukesha's turbocharged diesel Model 148-DKBS is rated 280-hp at 1200-rpm and has a 779-cu in. displacement.



This is cut-away of Fuller's new R-1150 Roadranger transmission. It has nine selective ratios and can handle up to 800-lb ft torque.

With stub shaft or power-takeoff clutch they are suited as replacement engines for small shovels, hoists, draglines, etc., and for powering compressors, conveyors and pumps. The generator sets will supply lighting on big draglines, shovels, etc. and serve as portable power supply units for contractors.

WAUKESHA—The Road Show coincides with the closing of Waukesha's 50th Anniversary Year during which time they produced many engines for road-building application. Featured at their exhibit will be five engines typical of the models widely used in this application.

Normally-aspirated and turbocharged diesels will be seen. Others in their line of over 30 different models, including their 1100-hp, 12-cyl VLRDB, will be shown.

And Components

To catalog all component exhibits would take exactly that—a catalog. We'll have to skip around. First, you'd expect to see an emphasis on driveline components in a show of this type. You wouldn't be wrong.

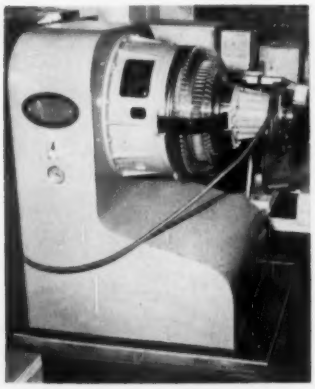
Ever wonder what goes on in a torque converter? Twin Disc wil show you. They have a plastic model of their 3-stage converter to help you visualize what goes on. They will also have representative models of their complete line of friction and fluid drives, some in cut-away form.

On the other side of the driveline fence, you'll see transmissions such as those built by Fuller Manufacturing Company. They'll show cut-aways of different models along with running gear components. Featured will be their R-1150 Roadranger transmission with nine selective ratios. Designed for use with engines developing up to 800-ft lb torque, it is used in off-highway equipment, logging equipment, etc.

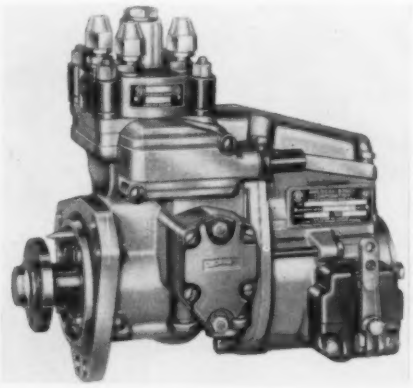
You'll see exhibits of engine components and accessories—the things that make the higher ratings practical without sacrifice in service life. For instance, Cleveland Graphite Bronze will show among other products their F-77 series bearings. They are steel-backed, have an intermediate layer of copper-lead alloy, plus a thin coat of white metal applied by the company's precision plating process. They are turning in good performances in the most difficult applications.

Then there is American Bosch with their line of injection equipment, ignition and electrical products. The popular PSB single-plunger, distributor-type pump that did so much for development of the smaller diesels will be featured. High-output generators, electric windshield wipers, small electric motors, magnetos,—they're all there.

You'll see Purolator's filters, Aeroquip's hoses, Weatherhead's fittings, and hosts of other good products. Why don't you just go see them.



At left is the Twin Disc 3-stage torque converter with plastic housing as it was prepared for shipment to ARBA Road Show.



American Bosch will feature this PSB single-plunger, distributor-type fuel injection pump at the ARBA Road Show.

Cooperative Studies are Developing Tomorrow's Construction Machinery

A STRING of letters — ERDL, CIMTC — spell real progress in design of construction equipment. The old adage about "Too many cooks . . . " is out the window and good riddance. Instead, "Two heads are better than one" is now accepted.

ERDL or the U. S. Corps of Engineer's Research and Development Center is one partner. The Corps is probably the largest construction agency in the world. Aside from "tactical" engineer activities, the Corps has a huge "Civil Works" responsibility plus a "Military Construction" mission. Witness their river and harbor work in the first category and military construction such as the Greenland, Icelandic and African Air Force bases. Hence their interest in construction equipment.

CIMTC is the Construction and Industrial Machinery Technical Committee of the Society of Automotive Engineers. Subcommittees are appointed to study specific phases of the overall problem. Two will be touched on here. One is concerned with "Ease of Maintenance" as it applies to construction equipment and the second with "Winterization"; real chilly stuff, —60°F or lower.

There's a third partner—industry. The roster of committee members is a cross section of the heavy construction equipment builders. After all, SAE membership comes from industry. So with high-level people backed up by the facilities and knowhow of the three partners, better equipment and techniques are bound to develop.

The reason for selecting these subcommittees for comment is that their spheres overlap to a degree. A good example is the mutual effort to simplify and hence cut maintenance time. This objective stands on its own feet regardless of any unusual temperatures involved but gains added importance in the "long-john" country.

ERDL has worked on this "ease of maintenance" program for some time. Some early findings were reported in DIESEL POWER, May 1955. Later work confirmed them. For example, removal of a motor grader hood was expedited by modification to cut the fastenings to four capscrews.

Following up this idea, the CIMTC subcommittee for "Winterization" made the following recommendation at a recent SAE Symposium. "The immediate relief should be to minimize use of tools and waste motions by . . . substituting hinged connections and a few large snap or pull-down hatches or hasps for numerous bolts and screws in the frequently-handled covers and panels."

This philosophy is reflected in recent recommendations of both subcommittees. One calls for use of quick-disconnect fittings for "plumbing" and electrical circuits. Another cites the importance of reducing grease fittings and of making them easily accessible. Still another emphasizes need to reduce the number of sizes, lengths and types of fasteners used in a given machine. Such consolidation will not only reduce necessary inventories but will avoid a lot of changing from tool to tool. Special tooling, of course, should be minimized.

Time studies on various typical repair jobs showed that a lot of time was spent removing (and later replacing) obstacles. In one case, the engine had to be removed to pull the clutch or transmission. To remove a starter motor, the injection pump had to be taken off. To take the engine out of a tractor, the equalizer spring had to be disconnected and the tractor jacked up.

Can anything be done about it? Yes. ERDL proved it on a motor grader. Time for removal and replacement of radiator and engine was reduced from 7.9 to 1.3 manhours (84%) by application of the ideas already mentioned. Also, they added lifting eyes and employed some realignment devices for improved handling and assembly.

Some manufacturers are conducting their own maintenance simplification programs. You might start thinking, too. The trend is growing, with the agencies mentioned serving as a focal point.

Winterization in the context used here must deal with two basic considerations—getting the machines to stand up under the severe conditions and making it possible for the operators to take it.

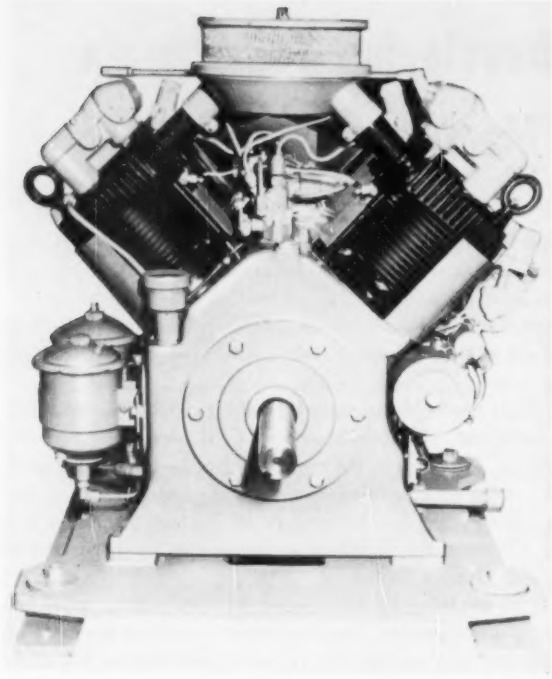
Starting at sub-zero temperatures is a primary problem. Good success has been reported, made possible by preheaters and priming aids.

Major components gave practically no trouble; it was the little things—broken lines, electrical wiring failures, minor heater troubles, etc. But although relatively minor in nature, a minor inconvenience at normal temperatures becomes a major trouble at "X" below.

Heated cabs for protection and comfort of operators were fitted in all cases. Here, there is more to be done on heaters and heating systems. A lot has been learned and more will be on both the materials and design of the cabs and particularly the hatches and enclosures.

Again the idea of simplication must apply to controls. An operator in bulky clothing must be able to start and operate the machine, adjust the heating system and do any other jobs while in bulky clothing.

Apart from the obvious need for solution of cold-weather operating techniques, there will be tremendous industrial advantages. Simpler maintenance practices, greater reliability of equipment and the definite possibility of extending construction season, year-round in some cases, are in the cards.



Hallett AC25, air-cooled, vee-type, 2-cyl, 13-hp (cont) engine.

What's Happening with Small Diesels?

One manufacturer of small diesels reports on their doings in the small engine field, and strikes an optomistic note on the future of these versatile prime movers.

WHAT'S happening to small diesels? Are they keeping pace technologically with the larger engines? How do they stand competitively? And what are they doing?

Let's see how one builder of small diesels answered these questions. This builder is American M.A.R.C., producers of the Hallett line of diesels ranging in horsepower from 5.5-hp to 21-hp.

M.A.R.C. reports that the answers to the first two questions are tied together. A lot of things are happening to the smaller engines—improved operational characteristics, greater popularity in new applications, etc.—because of technological improvement.

Engineering Angles

They point to a continuing program of design improvement and refinement aimed at improved performance, reduced weight and greater adaptability, all with increased service life. Included are revisions in the combustion system (precombustion chambers are used in all engines) and in the cooling system to permit higher power outputs.

One result of combustion chamber development is shown in the broad range of fuels recommended as acceptable. Fuels with API gravities between 44 to 28 deg, cetane rating of 40 or better, initial boiling points to a maximum of 425°F and maximum end point of 750°F can be used. This covers commercial diesel fuels, kerosenes, the JP-4 jet fuels and miscellaneous distillates within this range. Consumption will, of course, vary with the heating value of the fuel. However, a good round average with commercial diesel fuels would be in the order of 0.47 lb per bhp hr.

Cooling systems in both water-cooled and air-cooled models has been refined to eliminate hot spots. Special attention has been given to efficient cooling of critical parts, (oil-spray cooling of the piston through a drilled connecting rod, for example) to permit higher ratings without loss of service life.

Weight has been reduced by maximum use of aluminum alloys. Designs and sample castings have been sent to the Aluminum Company of America for their review and suggestions. It is anticipated that their facilities will be used for all large aluminum engine parts.

As far as keeping pace with big engine features goes, M.A.R.C. points out that many of these are incorporated

in these small engines. The crankshaft is forged, heat-treated and counterbalanced. Connecting rod bearings are steel-backed precision-type alloy bearings, pressure-lubricated by an internal gear pump through the drilled crankshaft. Aluminum pistons are used to reduce reciprocating weight and for effective heat transfer. In big-engine style, these are oil-cooled as mentioned.

One advantage of the small size is that the use of Timken roller main bearings is practical. These are splash lubricated.

Net result of all these modifications is an increase in horsepower output varying from 10% to 20% throughout the production range.

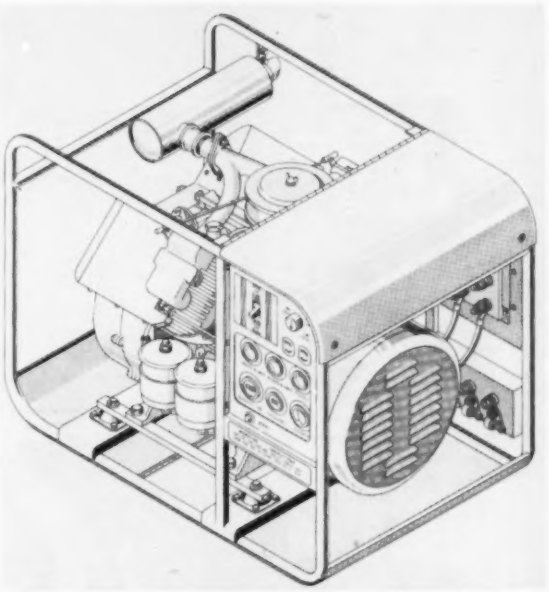
Competitive Angles

On the subject of competitive status, M.A.R.C. points to many ways that this can be considered. The principal competitor is the gasoline engine. In regard to initial cost, the spread is being narrowed. On the basis of cost per horsepower, power increases of as much as 20% considerably reduces the cost per unit of power. Manufacturing costs are not correspondingly increased—in fact, more efficient production has resulted as one phase of the engineering program.

Volume of production is another factor in cost reduction. M.A.R.C. reports that they are embarking on a production and marketing schedule developed to expand sales. Negotiations are under way for a new plant site to gear production for 500-750 units per month. Production equipment will be modern automatic and semi-automatic tooling.

Expanded distribution and sales facilities are being acquired. Western sales are currently being handled by Continental Sales & Service Company of Los Angeles and through their dealers in key cities. The Hallett line rounds out the lower end of the Continental line of engines.

A final factor in boosting production figures is the product itself—the types and horsepowers available, plus the adaptability of the engines for a wide range of uses.



Air-cooled AC2S engine powering a permanent magnet rotating field generator set, rated 8-kw. Entire unit weighs 485-lb.

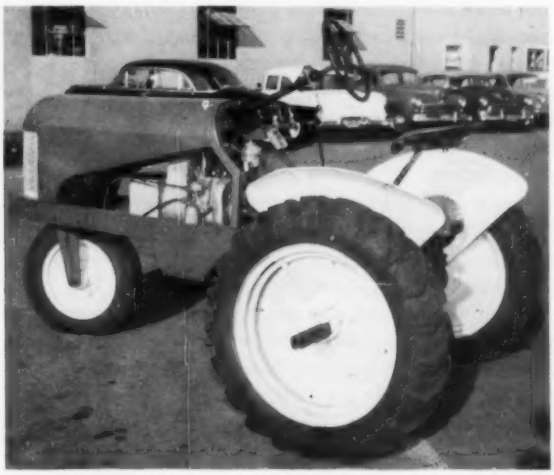
Hallett engines are available in both water-cooled and air-cooled versions within a power spread of from 5.5-hp to 21-hp. Basic models and ratings are given in the following table.

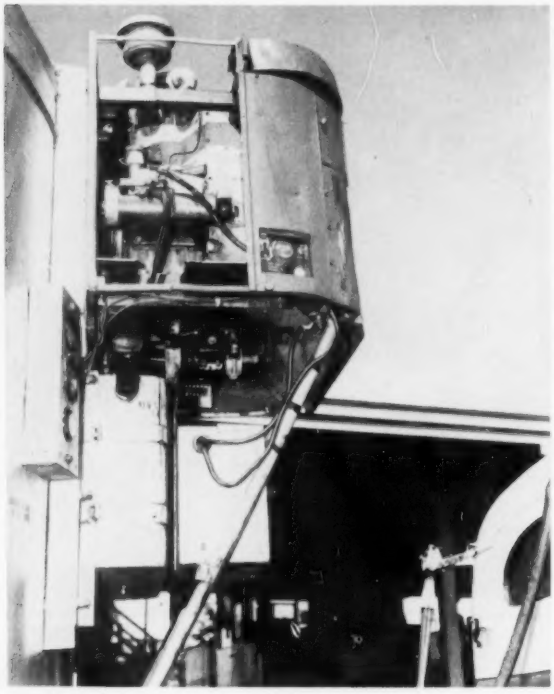
Model	*Cyl.*	*Bore*	*Stroke*	*Max. H.P.*	*Cooling*
AC1	1	3½	3⅝	6.5	Air
*AC2	2	3½	3¾	14	Air
WC1	1	3½	3⅝	7.5	Water
*WC2	2	3½	3¾	15	Water
D1A	1	3⅞	4¼	11	Water
*D2	2	3⅞	4¼	21	Water

*Marine models available at same rating except D2M rated 19-hp at 1500-rpm.

Base-mounted AC1, 5.5-hp air-cooled belt-driven pumping unit providing water to portable irrigation sprinkling system.

AC1 engines are being installed in small farm tractors. Note that engine is well exposed to permit efficient cooling.





AC1 installed as power source for refrigerator on a trailer. Engine is electric-started from small panel at bottom of unit.

An example of the adaptability of these units is seen in the design of the end-bell at the power take-off side. Interchangeable end-bells are available for applications such as direct connection to a generator, attachment of reverse gear, etc.

One angle-drive that is available enables the engine to sit directly over the driven member, as in the case of certain pumping units.

All these factors relate to engine acceptability in the field and hence potential production volume. As mentioned, this will affect initial cost. But another aspect is pointed out; initial cost is a poor standard for competitive decision.

A more accurate standard is the *total cost of ownership* from the time the engine is purchased until it is no longer in use. It includes such important things as fuel costs, maintenance costs, costs of downtime, etc. On this basis the diesel's competitive status is unquestionable.

Applications

On the final question as to what small diesels are doing, M.A.R.C. answers that, their engines are doing most everything small engines can do, and are doing it over a wide area. Military use, for one, presents a big market.

A sub-contract to produce engines for a specialized diesel-electric generator set for the Marine Corps is being completed. Indications are that some 1500 units will be required in fiscal year 1956-57. Other governmental agencies represent an even greater potential. Diesels will replace gasoline engines as power.

Several models of these specialized generator sets are being produced. One in which the Hallet engine drives a permanent magnet-type generator provides voltage and frequency stabilization that heretofore has only been thought possible in very large stationary electric plants.

For conventional power generation, the Alaska Native Service is currently using Hallett-powered generator sets in their native schools. Weather stations and remote communication setups are also going diesel. At air fields, diesels are beginning to operate all auxiliary electric generating equipment. In one application, a diesel-powered dolly is used to maneuver the big planes. These diesels have two added advantages over their gasoline counterparts—elimination of fire hazard and ability to use the jet fuels available.

In the commercial field, M.A.R.C. points to a broad range of applications. In Colorado's uranium fields, Hallets are powering materials handling cars in trackless mining operations. They power small tractor units. On construction jobs, concrete buggies are running on diesel power.

On farms, irrigation is one of the biggest jobs. Low cost, dependable power for water pumping means the difference between profit and loss. Power for electricity, running farm machinery, and for small tractors are other uses.

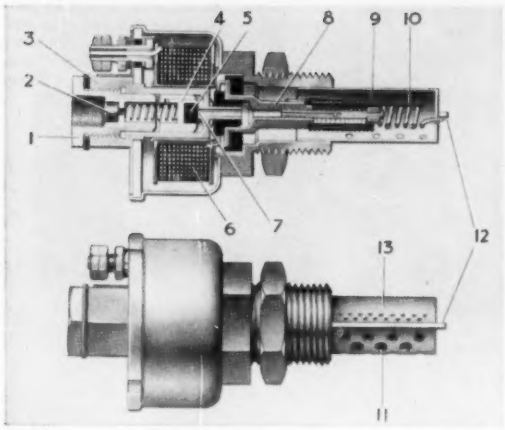
Hallet-powered refrigeration units have been mounted on both tractor-trailer units and railway refrigerator cars. Another railway application is for powering 2-way radios in cabooses.

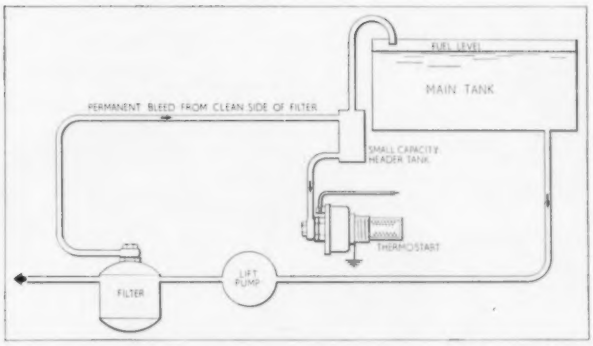
And these are just some of the applications cited for versatile little diesels.

Conclusion

So M.A.R.C. has answered all the questions asked. This report on one segment of the industry building small diesels indicates that the same vitality exists as is found in other parts of the industry. It also helps justify the prediction that 1957 will outstrip 1956 as a diesel year.

Material Handling car uses Hallett AC1 engine. Engine Provides power to mechanically load as well as propel truck.





This typical layout shows the method of connecting the fuel oil supply from the main tank to the header tank and Thermostart.

The interior and side views of the Thermostart has parts numbered so that it's easier to follow description of operation from text.

Cold-Starting Aid for Small Diesels

Simple electrically-operated cold-starting device uses engine fuel to heat intake air.

A NEW cold-starting aid is now available for small diesels. It is a simple, compact device that uses the same fuel as the engine to heat intake air.

Called the Thermostart, Type 285, it is made by C.A.V. Limited of London. It will be available in the U. S. with American threads and hexs through Lucas Electrical Services, Inc.

It has been successfully tested at temperatures less than 0°F on engines of 155-cu in displacement. This gives an indication of the engine sizes for which it is intended.

The device is electrically operated, has very few moving parts, and is actuated by just pressing a button or turning a switch. No preliminary operations are necessary.

It is screwed into the inlet manifold in a horizontal position at the point where the manifold divides. On an engine with a pneumatic governor, it's placed on the engine side of the venturi butterfly. In all cases it must be locked in the correct axial position as marked on the casing.

Gravity feed from a 25-cc container about four inches above the unit provides a positive supply of fuel. Filtered fuel continually flows into this container while the engine is running. Fuel from the container fills the pipe adapter (1), filter (2), hollow plunger (4) and the groove in plunger surface. When the switch is operated, the solenoid (6), and coils (9, 10) are energized by 12-v current from the battery. The solenoid causes the plunger (4), and rubber insert (5), to move off the valve seat (7). Fuel then flows at a controlled rate (10-cc per minute) along and around the coil (9), which vaporizes it.

Air drawn into the inlet manifold when the engine is cranked enters the circular shield through small perforations (13), and mixes with the vaporized fuel. This mixture, ignited by coil (10), heats the intake air as it is drawn into the cylinders. This helps ignite the injected fuel and make for quick starting.

The flange (12), along the outer shield surface, provides a sheltered zone around the large holes (11), and protects the flame from the incoming air stream.

To start the diesel, the switch is turned on for 10-15 seconds, then the electric starter is engaged. Both Thermostart and starter switches should be released at the same time when the engine starts. Under exceptional cold conditions, the heating device may be kept on for a few seconds longer after the engine has started to prevent stalling.

A single rotary switch is available which incorporates both the above switches and also permits operation of the starter alone when ambient temperatures are high enough. Current consumption for the entire unit is 15-amperes.

Water in the fuel system freezes when temperatures go down. Serious damage frequently results. If you have a torque converter using fuel oil as hydraulic fluid, you can get into more trouble.

Cat's Tips to Avoid Fuel System Freeze-Ups

No matter where your diesel works, a diet of water-in-the-fuel can give it indigestion during cold weather. A little PM can prevent a lot of downtime.

DIRTY fuel causes trouble at any temperature; but when the thermometer takes a nosedive, water in the system can lead to a lot of downtime. Fuel lines, filter housings, and even torque converters of some units have been damaged from water in the diesel fuel freezing. Caterpillar Tractor Co. has given an idea or two to help prevent some of this trouble.

Cold weather has very little effect upon the fuel system itself. Generally as long as fuel can be pumped it will work in the engine. It will, however, tend to congeal—and if the pour point is high you may have trouble getting it to flow, as it may plaster your filters with congealed waxes. But generally, the damage to the system comes from the trouble water causes when it freezes in the fuel system.

Source of Water

Chances are, much of the water was introduced into the system with the fuel, through a combination of fuel mishandling and moisture condensation. The former can generally be corrected by keeping hoses cans and pumps clean and dry of water and sediment.

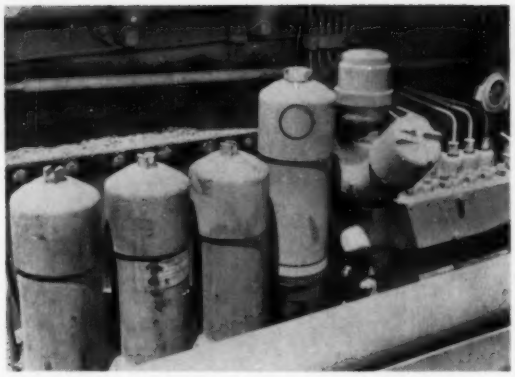
Preventing moisture from condensing into the fuel system generally involves more care, as the opportunities are more numerous. Drums should be stored under some kind of a shelter other than a tarp. This protects them from rain and snow, and the shade prevents the temperature variation that would occur if they were exposed to sun. Finish one drum before opening another, for once a drum is partially empty, moisture in the air will condense as temperatures change.

When drawing from the drum, place it with the rear slightly lowered to form a sump. In this position, water and sediment will settle below the drain-off level. Never drain the drum dry, or you'll have water and dirt in the fuel.

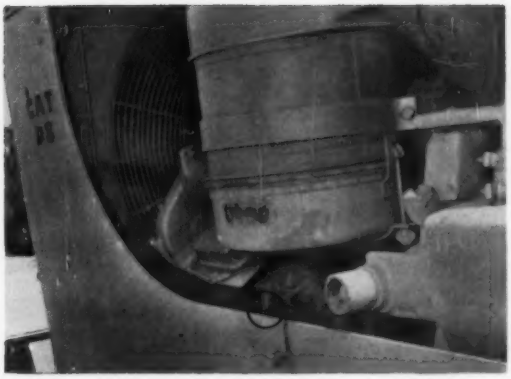
If it is impossible to set the drums up in this way, and they are stored endwise, it is even more important not to drain off that last drop. It will contain a lot of water and sediment.

After you get the clean fuel into the tractor's fuel tank you're still a long way from home plate. At the finish of each day's operation the tank should be completely filled with fuel. If air were allowed to remain entrapped in the tank overnight, low temperature would cause the moisture it contains to condense. A full tank doesn't allow any room for air.

In the morning it's a good idea to open the drain cock and drain off enough to remove any sediment and moisture



A filter element can absorb only so much water before it becomes saturated. It must then be replaced. Filter with circle filters the fuel oil before it enters the torque converter.



As the converter parts rotate, water in the converter is mixed with the fuel oil, and carried through an orifice and strainer back to the tank. A plugged orifice traps water in the converter.

that has settled during the night. Do this before starting the engine. In this way, impurities are removed before they are circulated to critical parts of the machinery, including the torque converters of some models.

Water in the Converter

The fuel oil serves a twofold function on caterpillar diesel engines and track-type tractors equipped with torque converters. In addition to the obvious, it serves as hydraulic fluid for the torque converter. Thus, water in the fuel means water in the torque converter, too.

But how about that filter element the fuel passes through before it enters the converter? If this element is working properly no water will pass through. But only so much water can be absorbed before the element becomes saturated. Half the answer is periodic filter element replacement; proper torque converter maintenance is the other half.

All Caterpillar torque converter installations of this type include an orifice and an orifice strainer. Approximately six-tenths gallon of fluid passes through this orifice strainer during every minute of operation.

As parts of the converter rotate, they mix any water that may be in the unit with the fuel, acting now as hydraulic fluid. In this way, some of the water is carried back to the tank through the orifice and orifice strainer. Therefore the orifice must be kept free and the strainer clean to prevent water from being trapped in the converter housing.

And here's another thing to remember. In the course of operating, a torque converter generates a lot of heat. Heat causes the converter fluid to expand, and the surplus fluid is forced through the orifice into the engine fuel filter housing.

When the engine is shut down, the fluid cools and contracts. Upon restarting, any water and sediment that settled in the fuel tank and is not drained off is carried into the torque converter fluid system by the make-up fluid coming from the fuel tank.

If the converter has been drained in the course of PM servicing, water and sediment in the fuel tank must also be drained before the converter housing is refilled by opening the cross-over valve. Otherwise, you will be defeating the purpose of the drain by refilling the converter with contaminated fluid.

Conclusion

A clean, water-free fuel supply is very important to all engines and tractors, especially those equipped with torque converters that use fuel oil as torque converter fluid. Always use clean, water-free fuel, and take whatever measures are necessary to keep it uncontaminated.

Fill the fuel tank at the end of each day to drive out moisture-laden air. Be certain the sediment and condensate are drained from the fuel tank before restarting. Follow the manufacturer's recommendations on a periodic torque converter fluid drain.

Filter maintenance is insurance. The better you treat your filters the better they'll treat your fuel. And you can save a lot of filter maintenance by keeping your fuel clean.

Whenever the converter has been drained, drain off any sediment and water from fuel tank before opening crossover valve, shown below, to fill converter. Also drain the fuel filter housing.

How Alco Diesels Are Modernized

A review of some of the benefits derived from improved materials and design features in new equipment, many of which may be obtained through modernization of old units.

MODERNIZATION is an extremely important phase of locomotive builders' activities. It applies to current production as well as to older locomotive units.

Changes are made to increase dependability and efficiency, make maintenance and repairs easier and more economical and give longer life. Diesel locomotive owners benefit according to how readily they take advantage of modernization programs.

Improved replacement parts which maintain interchangeability give automatic partial modernization to equipment.

Assemblies and kits of improved components interchangeable with older assemblies offer the next most readily available type of modernization. These may be applied by railroad personnel when necessary, or according to a scheduled program. If desired, complete modernization along with a complete rebuild, is available at the builder's plant.

As a review of recent improvements and designs in diesel locomotives equipment and parts, let us discuss the modernization program of a typical locomotive builder. The improvements to be discussed have been made through a period ranging from two or three years. The parts incorporating them are the latest available from Alco. Let us discuss these one at a time.

Air Filtration — Engine Intake Air

Alco Products Inc., is offering an oil-bath engine air intake filter as an optional. Tests show that its efficiency is above 95%.

This filter is said to require less maintenance for continuous high efficiency than do the impingement types generally used. Maintenance consists of oil-depth and sludge-depth inspection with oil changes from 3 to 6-months, depending upon dust conditions. The sludge need not be removed until it reaches the bowl's inspection plug. The cylindrical crimped metal screen-type media constantly scrubbed by oil, doesn't appear to ever need cleaning. At present, railroads have successfully applied these filters to over 300 Alco units.

Along the same lines, car-body filters on road switchers (1500 and 1600-hp) are available to provide cleaner engine compartment air. These 20-in. filters are installed in four new doors obtained from the builder. Two at the front contain three filter panels each; two at the rear contain two.

These filters provide cleaner air for cooling main and auxiliary generator equipment. They reduce load on engine air-intake filters. Added engine protection is particularly important in heavy road-switcher service where increased sanding may raise air-borne dust almost 400%.

A removable hatch over the exhaust manifold of these road switchers can be installed while the locomotive is receiving the car-body filter modernization. It simplifies removal and replacement of the manifold, and cuts locomotive downtime.

Water Cooled Turbochargers

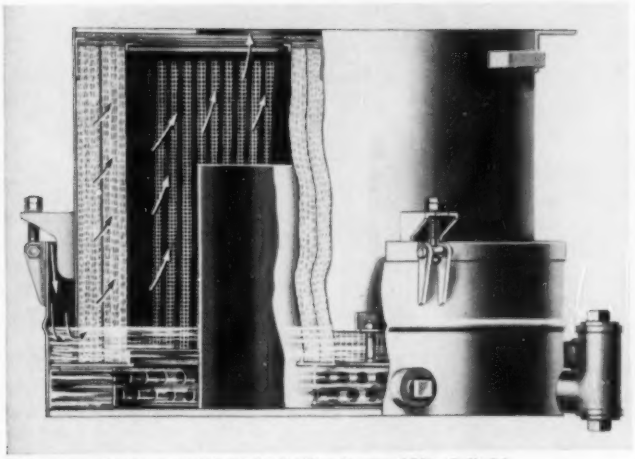
Water-cooled turbochargers made by Alco have been used successfully for six years. Today's Alco model 510 and 710 turbos have combined efficiencies of 59% and 61% respectively as compared to their predecessors efficiencies of 54% and 49%.

Though rotor assemblies are more rugged than preceding designs, Alco turbo rotors have about half the WR2 (flywheel effect) of their predecessors. Consequently they respond more rapidly to changes in engine speed and load, decreasing acceleration smoke.

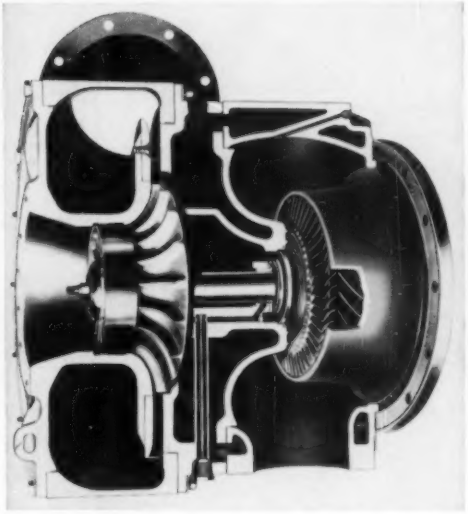
Alco's water-cooled turbo provides cooler combustion-air. This extends the life of valves, heads, pistons, nozzles, exhaust manifolds etc. Temperature of air for engine intake, generator and traction motor cooling is also lower since turbo doesn't dissipate its heat into engine room.

Initial low cost of this turbo, plus its low maintenance-cost has led to a mass changeout for Alco field diesels. Its simplicity and fewer points of critical tolerances permit cleaning and most common repairs to be easily made by railroad shop personnel.

Though each model Alco engine requires a different model turbo, design standardization permits considerable parts interchangeability. The water-cooled encasement silences so well that silencing media is not necessary.



Tests show efficiency of this oil bath filter is over 95%. Cylindrical crimped metal screen-type media is constantly scrubbed by oil.



Alco's new water-cooled turbo provides cooler air which extends life of valves, heads, pistons, nozzles, exhaust manifolds, etc.

Combustion-Air Aftercooler

A fin-tube heat exchanger is inserted in the air circuits between the turbocharger outlet and the engine manifold. Its main purpose is to improve performance, efficiency, and life of high-output engines by reducing the cycle temperature of the engine and exhaust systems.

Benefits from aftercoolers are especially pronounced in high altitude operation. Turbocharger speed increases at high altitudes. With an aftercooler, the increase in discharge temperature resulting from high blower speed is almost completely compensated, allowing practically full power without thermally overloading the engine.

An aftercooler also reduces engine temperatures when operating in high ambient temperatures. At 140°F ambient engine room temperature the exhaust temperature of an engine under test was 1190°F without an aftercooler and only 1095°F with one. This reduction results in substantial life improvement of engine parts.

During low-throttle operation, the aftercooler frequently acts in reverse. The engine cooling water is hotter than the air coming through, warms the air and increases the compression temperature. This enables the engine to burn some of the economy-grade fuels to better advantage and also improves idling.

This aftercooler has been applied only on Model 244, V-16 engines. It is standard on Model-251 engines.

Fuel Injection Systems

This subject, will be considered in two parts.

First, a modernization changeover was made from a 9-hole nozzle, to a 10-hole, 0.325-mm nozzle with smaller diameter injection line and a snubber valve. These increased fuel injection pressure, resulting in better fuel atomization, less smoke, and less lube oil contamination. The snubber valve prevents cavitation after injection, reducing injection line erosion.

Parts of this system cannot be interchanged with the older type. New parts are furnished in individual cylinder sets and must be installed as complete engine sets. The increased fuel pressure injection requires changing the fuel pump rack setting to 25.5-mm at installation.

To obtain the same power, and because snubber valves produce a slight time lag, engine timing must be advanced from 18 to 23-deg BTC. Installation of a wide crosshead assembly is recommended when converting to a 10-hole nozzle. In order to do so the cam faces should be in good condition.

A special leak-off line is provided to facilitate removal of the line and nozzle holder to reduce fuel oil dilution.

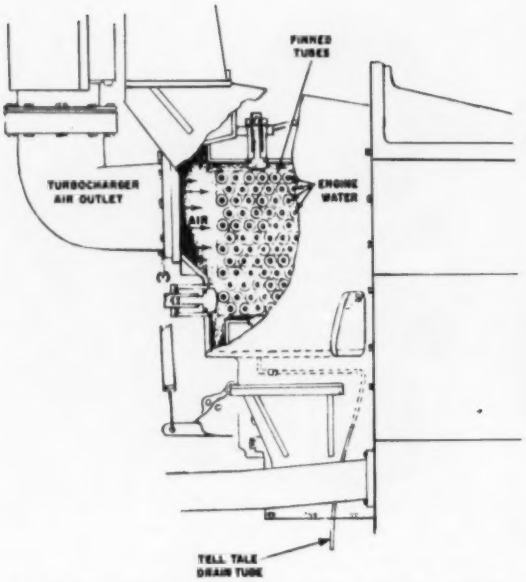
Second, a new, reduced-volume, non-interchangeable injection system was developed for the Model 244.

This new injection pump has a reduced delivery-valve volume, resulting in higher injection pressures and shorter injection periods. This, plus the volume reduction in the other injection system components, results in a much less elastic system hydraulically.

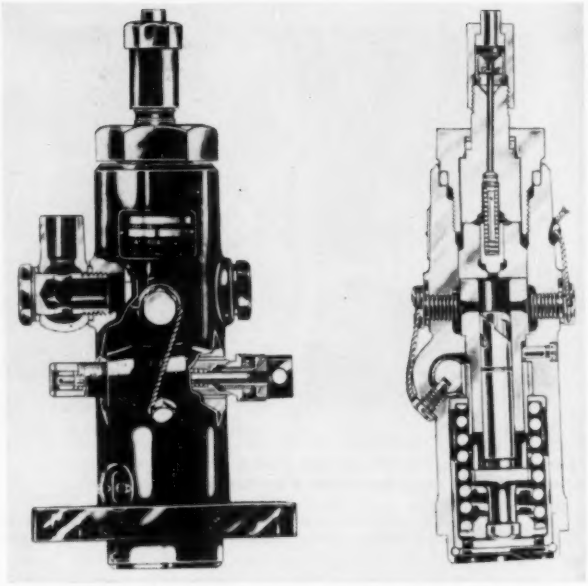
This compactness minimizes the effect of fluid compression and adverse shock-wave formation which cause longer injection periods and erratic after-injections. The delivery valve has a lapped face-fit at the bottom that eliminates the gasket. O-ring seals are used at the upper portions.

The nozzle has a different needle lift ratio and a wide seat to prolong seat life. Nozzle life is further extended by a reduced needle lift, reducing impact-stress between the valve and its seat after injection. One railroad found that this nozzle did not require rework after 300,000-miles.

The fuel pump crosshead cam roller must be wider to reduce the unit load on the cam and roller caused by higher injection pressures. If the camshaft is worn or grooved more than about 0.001-in. the cam faces must be reground or the camshaft replaced.



This fin-tube heat exchanger between turbo and engine manifold reduces cyclic temperature of engine and exhaust system. During low-throttle operation it warms the intake air.



Alco's new, high-pressure, fuel injection pump used with 0.375-in. nozzles gives higher injection pressures and shorter injection periods by having a reduced delivery-valve volume.

Series Lube Oil System

An improved lube oil system provides for a series flow from the pump, through a relief valve, (with a filter by-pass), cooler, a 100-mesh screen strainer, inlet header and to bearings. Oil supply is shunted off for auxiliaries, turbo. valve-gear etc., before header enters engine.

A pressure drop of 20 to 25-psi is maintained across a cotton-waste, pock-type filter element by a 20-psi full-flow valve operating as a differential valve. As oil flow increases with speed, the 20 to 25-psi drop remains with more oil being by-passed and vice versa.

To facilitate conversion, Alco furnishes conversion kits with either flexible Aeroquip hose or rigid pipe. The rigid pipe kits have either flange connections or couplings.

Ni-Resist Piston Insert

This insert, itself a casting, is cast integral with the aluminum ring carrier band that replaces the former solid forged-aluminum carrrier. Ni-Resist material has very high strength, excellent wear properties, and an expansion coefficient very close to aluminum. It increases ring groove life due to its comparative hardness, and prevents imbedding of abrasives which cause ring wear. This Ni-Resist ring groove holds the top ring firm in the piston resulting in increased life of the groove, ring, and liner.

The Ni-Resist insert has a keystone shape, which prevents it from loosening. The ring carrier is locked in place mechanically by its scalloped shape and also by molecular bond to prevent rotation and gas leakage.

Oil-cooling ring grooves remain unchanged, however, the piston is specially machined. The insert goes deep into the carrier. Therefore, the machining has been offset to provide a substantial amount of aluminum behind the insert to prevent breaking into the oil passages.

Laboratory and field tests indicate the lifespan of the protected ring groove will be increased.

Crankshafts and Bearings

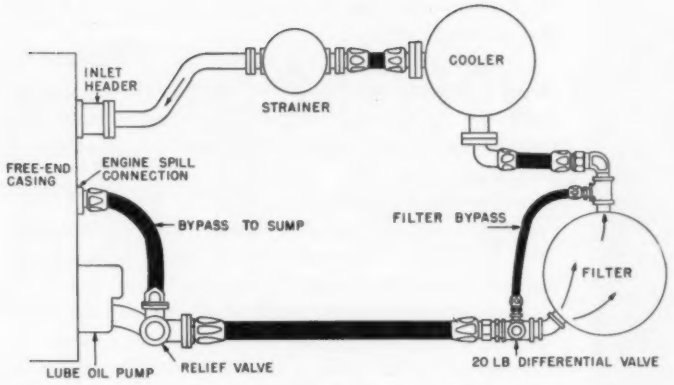
Alco has standardized on hardened-crankshafts of about 425 Brinnell number. This minimizes uneven wear and ridging which causes unequal load concentrations. This hardened-crankshaft is also less subject to scoring or welding between the shaft and bearing material. Factory rebuilt shafts are chrome-plated to obtain hard, wear resistant surfaces.

The most critical bearings requiring increased surface and thicker oil film are the con rod bearings and the center main bearing.

A load of moderate intensity rotating with a shaft, generally causes the same part of the shaft to get all the wear. A load of this type is difficult to lubricate since oil is being continually wiped away from the part of the shaft which is supposed to carry the load.

Alco's elimination of the bearing center-groove gives at least 100% more projected area and oil film thickness. With the central groove eliminated, oil gets into the clear ance space through spreader grooves or pockets adjacent to the parting lines. These pockets are fed from annular grooves communicating with the oil supply pipe in the main bearing cap.

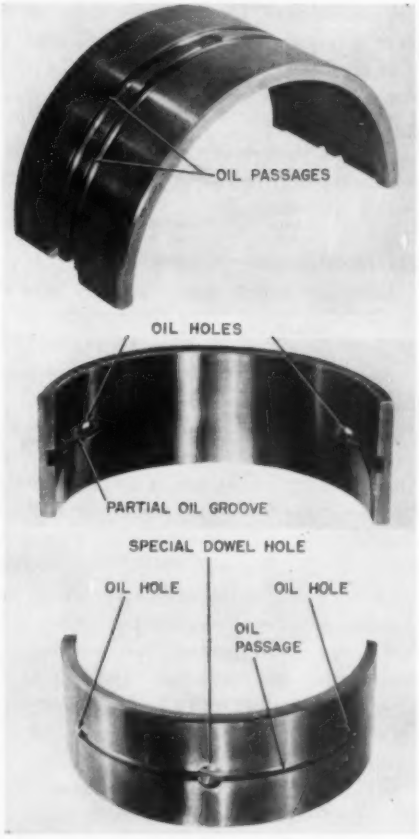
Since the crankshaft has no holes to adjacent crank pins from the center main bearing journal, oil supply to these



An improved lube oil system provides for a series flow from the pump, through a relief valve, oil cooler, 100-mesh screen strainer, inlet header and to bearings. Oil is shunted off for auxiliaries, turbocharger, valve-gear, etc., before header enters the engine.

Th ring carrier is locked in place mechanically by its scalloped shape and also by molecular bonding to prevent rotation and the leakage of gas.

A grooveless center main bearing is seen at top. Note the grooves and cap lock on the back of this bearing. The upper half of a partially grooved con-rod bearing is seen in center. The back view of this bearing is at bottom. Note special dowel hole.



pins must be provided. In Tocco hardened-shafts this is taken care of by holes from other main bearings.

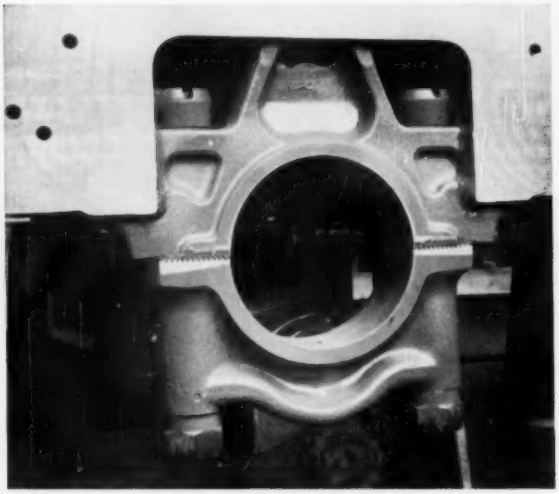
In Model 244 engines additional shaft holes are drilled and some existing ones plugged. Thus, crank pins and con rods nearest to the center mains can be supplied with oil from other main journals. A new main-bearing cap-lock prevents the wrong bearing application. Only an ungrooved shell can be applied to the cap fitted with the new lock.

Since the upper half of the rod bearing shell has the greatest constant loading, only this shell was redesigned. By eliminating the central groove in the loading zone, 14% projected area, and 100% oil film thickness were gained.

Serrated-Cap to Saddle-Joint

The change to serrated-bearing cap-to-saddle-joint was made to eliminate troubles with the original tongue and groove design. An interference-fit located the cap quite accurately but wear loosened the fit. Also, the key arrangement was not particularly suitable for transmitting side loads from cap to saddle. The outcome was fretting wear, which resulted in such bearing conditions as bore distortions, misalignment, edge bearing loading, and excessive loads on some bearings.

Radial holes at the ends of the bearing's partial-grooves lead oil to a groove in the steel back. This groove connects with a rifle-drilled hole in the con rod. A special slotted-dowel in the rod bore registers with the groove in the steel back and prevents use of the old shell. No change is made in the lower shell.



This new serrated-cap to saddle-joint design permits free juggling until the serrations contact, making misalignment more noticeable during assembly. When assembled, saddle and cap act as a unit, each gaining in load capacity from the stiffness of the other.

The present serrated-joint design overcomes effectively the shortcomings described since it is capable of transmitting shear. Saddle and cap act as a single unit, each gaining in load capacity from the stiffness of the other.

Other important improvements were incorporated in the same design. Changing the shape of the cap forging gave increased stiffness, and eliminated a stress-raising fillet condition at the nut seat. Main bearing stud location was altered to distribute bolt loading more evenly over joint area.

The new joint design can be juggled freely until the serrations contact, making any misalignment more noticeable during assembly.

Electrical Modernization

Important modernization changes have also been made in electrical components. The amplidyne control system has been simplified. This new system, reduces maintenance costs, improves reliability, and reduces inventories through standardization.

The excitation panel, engine-control panel, and engine-speed relay panel have fewer devices and connection points. These three compact panels are mounted somewhat like drawers in the contactor compartment. Moving the engine control devices to the control compartment reduced wiring 25%.

Locomotives having dynamic braking, have eliminated braking contactors. New heavy-duty dirt and tamper-proof relays, mounted separately for easy replacement, require considerably less inspection. The new engine-start panel simplifies operation with a 2-position engine-control switch (idle-run), and two push-button switches are used for starting and stopping.

Locomotive acceleration is increased by using an improved wheel-slip system without a major change in electrical equipment. The water temperature control system also was simplified.

Complete rewiring of the locomotive is facilitated by use of wiring harnesses and overhead wireways. Wireways inside the engine room simplify future maintenance and inspection and offer complete protection from the elements.

Alco Service Centers

Modernization kits may be obtained from Alco renewal parts distribution centers located in major railroad centers throughout the country. Alco has built three new warehouses in the last two years and established and expanded two new central distribution warehouses. All of these incorporate the latest modern devices to facilitate materials handling, packing and shipping.

What Do You Know!

Here are some questions to test your general knowledge of the diesel field. Make your selections, then turn to Page 70 to check them.

1. Dual-fuel engines are useful in certain type of sewage disposal plants because:
   a. The combination of natural gas and liquid fuel is cheaper in many areas.
   b. Outside power is not available in most plant locations.
   c. The engines run on liquid fuels and use the waste sewage gas available.

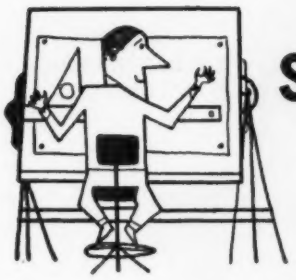
2. In the portable diesel-powered hydraulic dredges being used in construction work, dredging sand, aggregates, etc., the term "10-in. dredge" would refer to the:
   a. Diameter of suction line.
   b. Diameter of dredge pump.
   c. Diameter of discharge pipe.

3. Smaller diesels, because of their size, are very critical to the grade of distillates used as fuel and possibility of horsepower increases are limited.
   a. True b. False

4. Water can be kept out of a fuel system by:
   a. Keeping fuel tanks full.
   b. Protecting fuel drums from weather and temperature changes.
   c. By bleeding the fuel tanks, fuel filters cases etc.

5. One way to increase projected area of a bearing and increase thickness of lube oil film is to:
   a. Use heavier lube oil.
   b. Redesign to eliminate center oil groove.
   c. Increase oil pressure.

6. Delivery valves in fuel injection pumps are only used to prevent fuel in the line from draining back into the pump supply when the ports open.
   a. True b. False



service section

Recent engine and equipment modifications, procedures and recommendations straight from the different manufacturers to you

Heat Indicators On I-H Engines

Field reports indicate that trouble has been experienced with the heat indicators, due to the cables being assembled too close to the exhaust manifolds. The cables have now been rerouted on the TD-14 (142 Series) (Serial No. TD-142-43266) as shown in illustration #1, and on the TD-18 (182 Series) (Serial No. TD-182-37474) as shown in illustration #2.

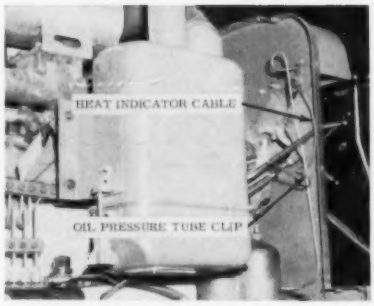


Fig. 1

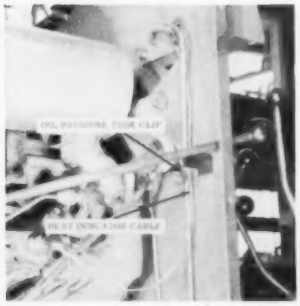


Fig. 2

To make this change in the field, it will be necessary when making the initial bends in the cables to be sure they clear the Governor Control Rod on the 142 Series and the Compression Release Lever on the 182 Series. Also, it will be necessary to place the cable behind the clip that holds the Oil Pressure Tube in place.

Valve Tappets on Cummins J Engines

A steel sleeve and a new tappet guide has been released to aid in maintaining tappet alignment in J series engines.

The split steel sleeve, Part No. 108156, is pressed lightly into the valve tappet so that with twisting action it will slip a few thousandths inch and prevent the shock load from being transferred to the tappet guide. Also the additional guide area provided by the sleeve and the tappet will increase service life.

The new tappet guide, Part No. 108158, is 1/16-in. longer than former guides so it will engage the steel sleeve inside the tappet. The new guide also has a groove around the head for identification.

A complete valve tappet assembly, with steel sleeve, is available as BM-36367. Injector tappets are not affected by this change.

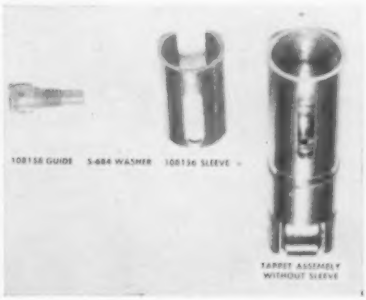
Current tappet guides, Part No. 107941, will continue to be used with these tappets.

The 108156 steel sleeve can be added to valve tappets now in service as follows:

A. Compress sleeve and align guide slots in the sleeve and tappet.

B. Press sleeve into the tappet until it is flush to 0.010-in below top.

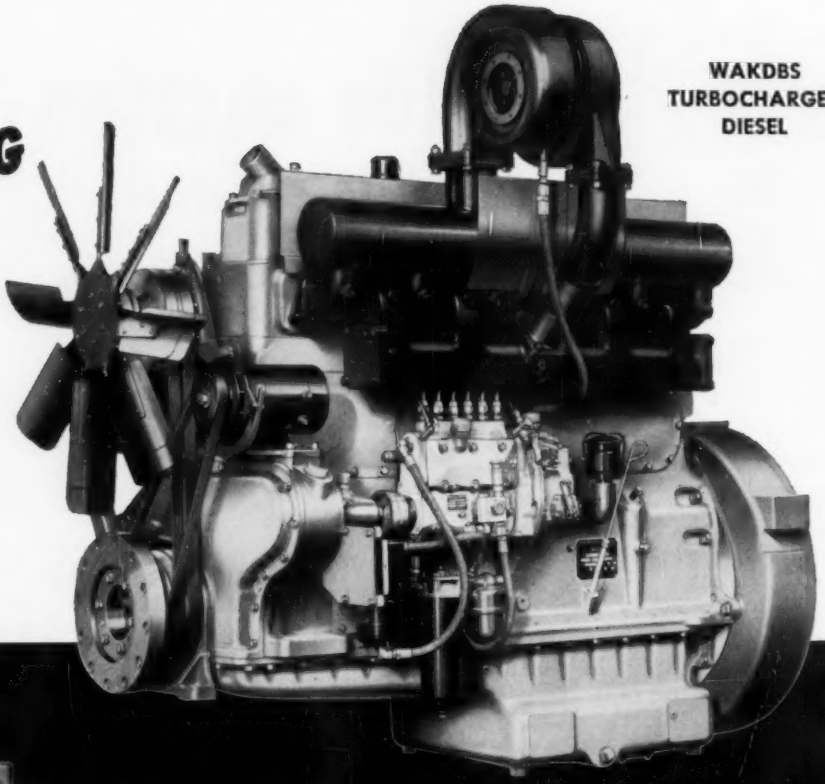
C. Use only 108158 tappet guide with valve tappets containing the 108158 sleeve.



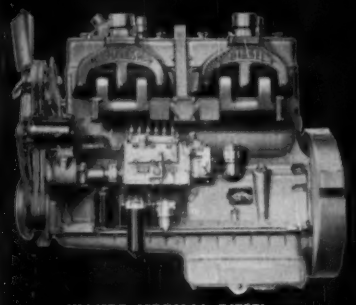
All J series engines after engine serial No. 147436 will contain the new valve tappets and tappet guides.

FOR HEAVY HAULING

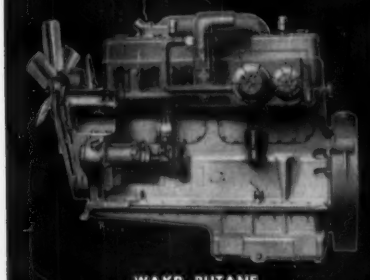
WAKDBS TURBOCHARGED DIESEL



WAUKESHA



WAKDB NORMAL DIESEL



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WAUKESHA MOTOR COMPANY

Waukesha, Wisconsin

New York Tulsa Los Angeles

news of our industry

Caterpillar's 25th Anniversary

Caterpillar Tractor Co. is marking the 25th anniversary of its successful introduction of the modern, mobile, heavy-duty diesel engine.

In November, 1931, Cat manufactured the first commercially successful engine designed specifically for use in a crawler-tractor. It represented the pioneering step in freeing the diesel from stationary foundations and making it a mobile power unit.

Given the designation D9900, this first Cat diesel was used to power the Cat "sixty" tractor. Its success popularlized the diesel, and was instrumental in establishing the variety of present applications. Prior to this time, diesels were complicated, massive, required frequent adjustments and maintenance, and were used almost entirely in stationary application.

Introduction of the D9900 culminated a lengthy research program. The first production model engine was a 4-cycle, 4-cyl design, with a bore and stroke of 6⅛-in. by 9¼-in. Turning at 640-rpm, it developed 89-horsepower. Because it was to be used in the field, the fuel delivery system was refined and simplified.

The Caterpillar "sixty" shown above is serial #1C1 given to the first of its class—the first Cat diesel-powered track-type tractor ever produced. It is still going strong, doing its share of the work in log skidding operations.

Development of a New Chemical Designed to Reduce Slippage of Locomotive Wheels

The Reading Railroad, National Aluminate Corp., and General Electric Co. announced joint development of a method to reduce locomotive wheelslip, a long-standing problem of the railroads.

After nearly a decade of research and testing, it was disclosed that the development is a way of spreading a new chemical on the rails. Applied directly by a motorized car operated independently of trains, tests indicate the chemical will give a minimum increase of 25% in adhesion limits of locomotives over present tonnage ratings. Known as "rail conditioning", the process operates under all weather conditions.

Exhaustive studies showed that an almost invisible oil film spread by moisture and resisting the weight of locomotives was making rails slippery. After this was established, National Aluminate developed the new chemical which "broke the oil film", and produced immediate improvement.

Tests were made over a period of years in a mountainous area (the Catawissa Branch of the Reading) with difficult grades for heavy tonnage hauls. These tests disclosed a minimum rise of 25% adhesion with the chemical application to the rails—even greater on grades less severe, shorter in length, or heavier in traffic volume.

According to Joseph A. Fisher (President of the Reading), results will be shared with other railroads. "What has been accomplished to date is merely the point at which we embark on still further developmental work . . . . "

new products . . . . . Page 64

new literature . . . . Page 68

organizational news . . Page 72

news of our industry

To Save Space

Caterpillar uses a "wrap around" base and fuel tank on generator sets, D311 through D342. It makes the whole thing more compact.

Annual Grant Renewed

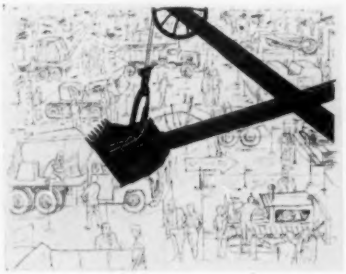
International Harvester has again renewed its annual grant in support of the ATA Foundation.

Diesel Engine Operates Small, Portable Sawmill Profitably

One company, consisting of two owners and three employees, taps stands of timber that are unprofitable for larger mills. They cut it into rough blocks with power from a Detroit Diesel 3-71 engine. In this business profit margin is small; however they cut about 20,000-board ft of timber per 5-day week at a fuel cost of about $7.00 per week.

And Don't Forget

The A.R.B.A. Convention and Road Show is coming soon. Below is an artist's conception of what to expect.



Vacuum Impregnation

Government of Pakistan Railways will soon install the largest unit to impregnate armatures and field coils of diesel-electric traction motors with insulating varnish. Impregnation under vacuum insures deeper penetration of the insulating varnish into the crevices, reducing breakdowns.

MM Crawlers

First of the new crawler line built by a revitalized Minneapolis-Moline will be equipped with gasoline engines. Diesels and LP gas models will follow.

Weatherhead in Sweden

A recent Trade Fair held annually in Stockholm featured an exhibit of the Weatherhead Ermeto fittings by the Stockholm distributor. Weatherhead is a familiar name even in Sweden.

Hi-Fi Grinding Inspection

The sound of a grinding wheel tells the experienced operator when the wheel has "sparked out", indicating a properly dressed wheel. One shop has hooked up high fidelity electronic equipment to amplify the sound above the other sounds in the area to eliminate guess work. Equipment is mounted to a Norton "6" angular wheel head grinder.

Here's Why

PERFORMANCE IS BETTER WITH Bendix STARTER DRIVES

CHECK and COMPARE THESE FEATURES

- Starting motor can be mounted more easily and in more positions.
- Requires no actuating linkage—solenoid can be placed in any convenient position.
- Simple in design—has fewer parts—needs fewer adjustments.

It takes a truly outstanding product to receive over 100,000,000 endorsements. Yet, that's the number of Bendix Drives that have been installed. No other starter drive approaches this record of outstanding performance. That is why, whatever your type of diesel or whatever its purpose, it will pay you to specify Bendix* Starter Drive for the most economical installation and dependable performance. *REG. U.S. PAT. OFF.

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For over 49 years, Park has specialized in the closed-die forging of crankshafts, connecting rods, camshafts, crankcase parts, main bearings, gears, pinions, axles and steering knuckles.

Park's facilities include a complete die sinking shop, modern specialized heat treating equipment and experienced metallurgical and engineering staffs.

Die Forging Specialists Since 1907

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CLEVELAND 3, OHIO

CARBON, ALLOY AND STAINLESS STEEL CLOSED-DIE FORGINGS FROM 4 LB. TO 5000 LBS.

news of our industry

Diesels for Pennsy

Delivery of 55 general-purpose diesel locomotives, and authorization for the delivery of 50 more, will make the Pennsylvania Railroad 95% diesel powered by the end of next Summer.

Diesel-Electric Railway Crane

A 200-ton "monster", capable of lifting 125% of its own weight, has joined the Union Pacific. Two 175-hp diesel engines, driving two generators, give a versatility far in excess of the three other steam-powered equal-capacity units already in use, as well as faster service and greater economy.

Converter Standard Equipment

The Wagner LG-18 Logger features a Twin Disc torque converter as standard equipment. It was discovered that in this rugged operation the converter lessened shock loads, put less strain on the engine, and gave a smooth, steady flow of power.

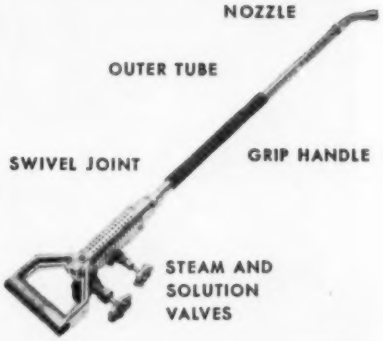
Importance of Maintenance

The increasing role of maintenance in all levels of the nation's production and distribution system will be reflected in the record breaking proportions of the 8th Plant Maintenance and Engineering Show, to be held in Cleveland in January. Conference sessions are expected to attract over 2500 engineers.

Heavy-Duty Air-Cooled

Recent installation of air cooled diesel engines have proven that they can take it. Three Deutz engines, a 12L614 operating a rock crushing plant; another installed in a piece of construction equipment; and an 8L614 installed in an earthmover have been operating at high-altitude sites under heavy-duty conditions. They start and warm up fast, and fuel consumption has been very good. They are also becoming very popular in over-the-road applications.

New OAKITE HURRICLEAN STEAM GUN



removes heavy soil in half the time!

If you had designed this new "HURRICLEAN" Steam-Detergent Gun yourself — if you had planned it, part by part, to enable you to steam-clean more thoroughly, quickly, easily, at lower cost, you couldn't have suggested one practical advantage that isn't incorporated in the "HURRICLEAN" gun.

Check these big advantages:

- ✓ Works off plant steam supply — no tanks, pumps or injectors needed.
- ✓ No more burns — cold solution travels along outer tube. Keeps grip surface cool.
- ✓ No more hose twisting — to change direction of cleaning spray, merely turn rubber grip on its rotary joint.
- ✓ Lightweight — gun weighs only 6 1/4 pounds.

To get a close-up of this new gun in action, to see how easily it works, how safe it is, how well it cleans, see your nearby Oakite man for a *free*, practical demonstration. Send for illustrated brochure. Oakite Products, Inc., 22C Rector Street, New York 6, N. Y.

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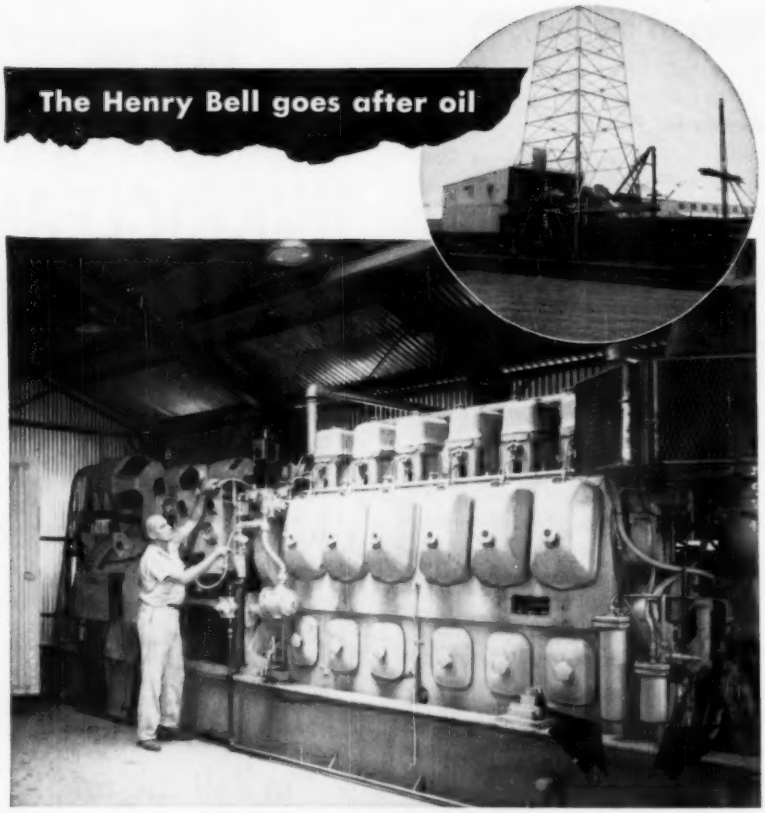

. . . protected by NUGENT FILTERS

This installation is in the main engine room on The Henry Bell, modern offshore drilling rig, operating in the marshland oil fields of Louisiana.

The crew lives aboard, therefore, the two compact diesel-electric power units, designed by Alco Products Co., Inc., are required to supply power not only for the rig, but for lighting, cooking and air conditioning.

To protect the diesels, Alco incorporates Nugent lube and fuel oil filters in their design. Dirt and carbon are prevented from reaching vital engine parts by utilizing Nugent full flow strainers and by-pass filters on the lube oil system. Fuel oil is also Nugent filtered to remove impurities that could clog injection nozzles and cause faulty combustion.

This is the kind of protection any engine needs—on land or on water. Whatever your filtering requirements, there's always a Nugent Filter available . . . at low cost . . . of proper size and type.

Let us show you how Nugent Filters can improve engine efficiency . . . why they are standard equipment on so many leading diesel engines.

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news of our industry

"Giant Lubritorium"

An apt description for the Union Pacific's new diesel shop now nearing completion in the Council Bluffs yard. The $2 million structure, started in March 1955, will soon be signed over to the railroad's Operations Dept.

"Coming Out Fighting"

Minneapolis-Moline is marshalling its forces to spark the farm machinery market. Centralized production, leveling-out work schedules, and diversifying their product line, as well as increased research and reorganization of the pattern of sales financing and distribution have been initiated.

Invite by ARBA

In order to assist the aims of the ARBA, an invitation has been extended to associated businesses to join the Materials and Services Division. Services afforded members include informational reports, technical services, statistical services, interpretation of government regulations, as well as conventions and conferences to exchange ideas.

International Cooperation

International teamwork with resultant ideas and design changes were reviewed at the SAE's National Diesel Meeting. American, Swiss, Dutch and American engineering know-how got together to revise Worthington's UTC two-cycle spark-ignition gas-engine from pump scavenging to the present SUTC or exhaust gas-driven turbocharged unit.

Leece-Neville Retools

To meet an anticipated increase in demand for its line of electrical equipment, Leece-Neville is modernizing. According to Mr. Neville, company President, "we are entering into a considerable retooling program to meet this expected increased demand, and it is expected that one-half million dollars will be spent on new machinery and machine tools to further modernize our facilities."

news of our industry

"Sea-Bee" Protection

Protection against small arms fire will be offorded to future "Sea-bees" through use of an armored kit developed by Army Engineers. The kit, which can be field-mounted, has been specifically designed for Cat D-7's and D-8's.

Model 12-498 in Tug

The tugboat "Matton", the first barge-towing tug to be powered by the GM Cleveland Diesel model 498, has been in continuous service since September. Its performance has equalled the highest expectations.

Safety Certification

The Certification Committee of the National Committee for Motor Fleet Supervisor Training has admitted 21 new certificates, bringing the total to 95. Fleet safety activities represent the fields of education, insurance, trucking and bus operation.

Thin Metal Plating

Linde Air Products Co. has developed a process whereby a thin layer of either wear-resistant tungsten or protective aluminum oxide can be placed on metal. During application, the temperature of the base metal never exceeds 400°F. The hard tungsten can be placed over areas of wear, while the aluminum protects metal surfaces from deterioration. Thickness varies from 0.001 to 0.014-in.

Diesel Efficiency

According to Ernest Chatterton, Chief Engineer of the Piston Engine Div. of D. Napier & Son, Ltd., the greatest possibility for reducing the size and weight of diesel engines for marine and railway uses is offered by a highly supercharged two-cycle engine compounded with a turbine driving an axial flow compressor. The cylinder layout which offers the greatest potentiality for such development is the 'opposed piston' engine.

Easier Borrowing for Small Water Projects

A new law gives Interior Dept. $100 million to lend to state and local water agencies—without prior approval from congress. It permits Reclamation Districts and the like in 17 Western states to borrow up to $5 million for such things as irrigation distribution systems, dams, diversion works, and canals. The law does, however, allow congress to veto within 60 days any loan approved by Interior.

Why They Last So Long

That continuous operation you get from your diesel is the result of a lot of precision—it didn't just happen. Cummins engines' main bearing bores, for example, are microhoned and checked with a gage 44 inches long, and 0.007-in. under required size. Gage must have a simultaneous slip-fit through all bores in the block. Tolerance for roundness is less than 0.0002-in., and finish is held to the specified 55-microinches.

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FUEL INJECTION EQUIPMENT

for Diesel Engines

Depots and Service Agents in over 100 countries

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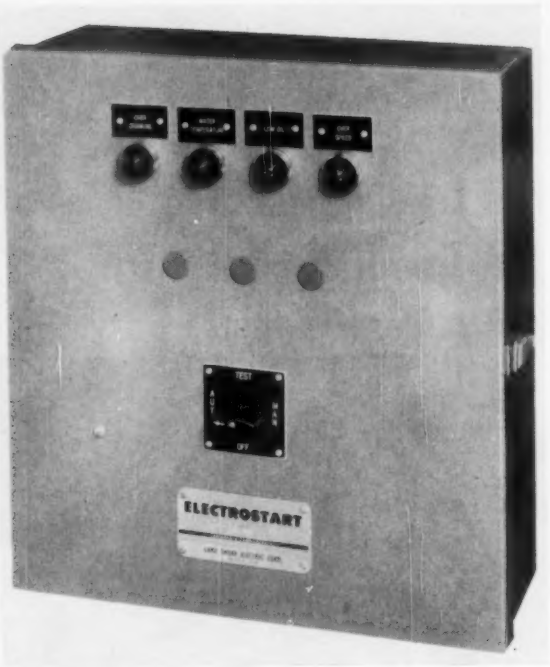
AP174-819

new products



Automatic Start-Stop Control

A heavy-duty "Electrostart" diesel engine control automatically starts and stops any diesel engine equipped for storage battery starting. Fully protected by automatic shut-down devices, it will operate on 12, 24, or 32-v. The developer and manufacturer, Lake Shore Electric Corp., claims that it will operate from any type of remote pilot switch, including automatic transfer, temperature, pressure, float, or load-demand type.

A 5-shot (interrupted) or 1-shot (single-cycle) cranking motor is available. One-shot cranking period is adjustable from 5 to 60-sec.

Interrupted cycle model uses a universal gear motor and programmed cam to give five equal crank periods with four equal rest periods. Crank periods are adjustable from 5 to 30-sec, with overall cranking time of 25 to 150-sec. Both controls are reset automatically when the engine starts or stops.

Protective features react to overcranking, over-speed, water temperature and oil pressure. A time-delay relay permits cranking.

Optional features are pushbuttons for start and stop, twin engine controls for two-engine drives, and failure signals that do not stop the engine.

Roller Bearing Design Change Provides Better Lubrication and Longer Life

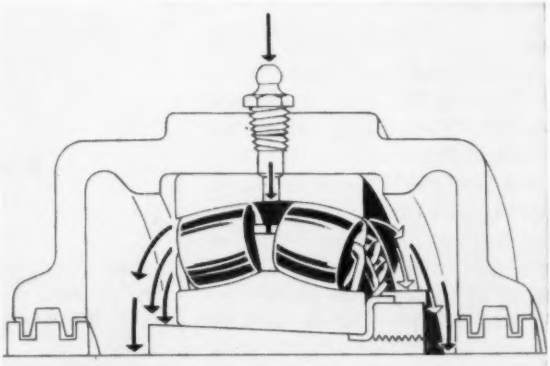
SKF Industries announces an innovation in spherical roller bearing design. It is claimed that the improvement provides 25% to 50% increased capacity, size for size, and from 2 to 3½ times more service life. It hinges on a method of obtaining a more efficient "center" instead of "side" lubrication of the bearing.

A groove is machined around the circumference of the bearing outer ring. Equally spaced holes drilled in the ring channel the lubricant from the groove to the center of the bearing.

The lubricant, which enters through a fitting in the center of the housing cap, moves along the groove and through the holes directly to the center of the bearing. Thus, all working surfaces are lubricated.

Since the flow-path of the lubricant is from the center to the sides of the bearing, the outward flow flushes away the old lubricant. With it go abrasive dust, dirt, moisture, or other impurities. The fresh lubricant keeps the bearing clean and well lubricated.

This new method of lubrication can be used in any existing housing by drilling and tapping a new hole for the lubrication fitting in the center of the housing cap, and plugging the original hole on the side.

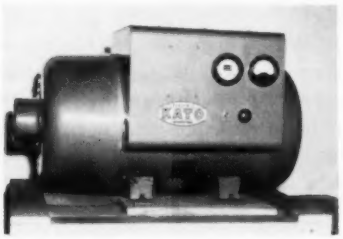


"Spacemaker" Carriers

White Motor Co. has introduced a new series of light-weight highway transports with more loading space, called the "Spacemaker" series. It includes 6 basic models, available in a variety of wheelbase lengths, and with a choice of components to fit the needs of highway carriers operating in every state, under every highway condition.

In-Block Grinding

To keep the engine going when you need it going, Winona Tool Mfg. reports that with a new, large hook their Intheblok Crankshaft Grinder can grind crankshafts up to 3½-in. diameter in the block. A smaller hook adapts the same equipment to grind shafts from 1-in. to 1½-in. Thus, the range is from 1-in. through 3-in.



A-C to D-C

Kato Engineering Co. has introduced a small, light-weight motor-generator set to convert direct current to alternating current. Designed for low maintenance, both motor and alternator are incased within a common frame with a single shaft and two ball bearing construction, thus eliminating a coupling and creating a compact, space-saving and light-weight unit.

Filter Coverage Expanded

The "super-flow", pleated paper line of Briggs Filtration has enabled them to expand their filter coverage to include off-the-road equipment, small marine requirements, and the truck and bus field. All products are designed to meet all original equipment specifications.

Temperature control means top gear efficiency. Western Gear Corp., of Lynwood, California, knows that to keep their Sea-Master reverse and reduction gears for marine diesels at top efficiency the lubricating and hydraulic oil in these units must be cooled properly. W-G specifies Young Shell & Tube Heat Exchangers for this reason.

On the Model 180 Sea-Master above a single pass Young unit is utilized. It provides ample cooling under adverse conditions.

For cooling oil or water, for heating or cooling any liquid or gas, for either fresh or salt water applications Young Heat Exchangers are used *where quality counts*. They are economical in first cost and in operation. Young exchangers include factors for fouling and safety. They are easily inspected, cleaned, and maintained.

Write Dept. 417-A for FREE Catalog

Young RADIATOR COMPANY

RACINE, WISCONSIN

Creative HEAT TRANSFER ENGINEERS FOR INDUSTRY

Heat Transfer Products for Automotive, Aviation and Industrial Applications. Heating, Cooling, Air Conditioning Products for Home and Industry.

Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Mattoon, Illinois

new products

New Insulating System

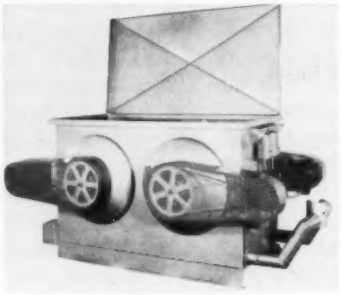
Allis-Chalmers announces an "integrated" field coil with a newly-developed insulating system designed to protect electric motors and generators against atmospheric contaminants and other destructive forces.

Liquid Detergent

To meet the growing demand for a general purpose cleaner in liquid form, Liqui-Det is being marketed by Oakite. Soap-free, there is no build-up of film, even after repeated use without rinsing. It does not injure the hands; yet removes dirt such as found in diesel locomotive cab interiors.

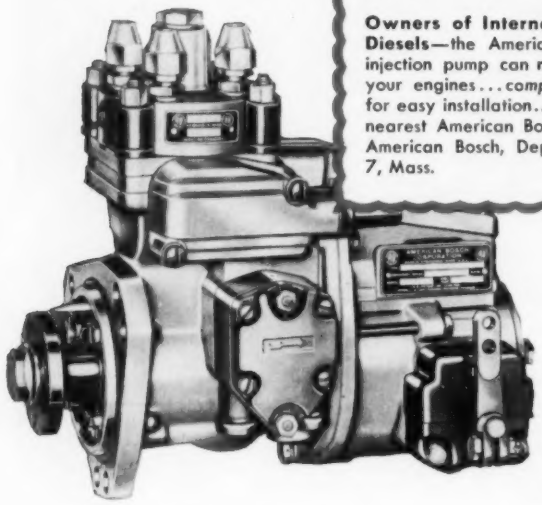
Parts Cleaning

A parts and block cleaning machine, diesel sh. p model 236-SM, has been marketed by Storm Vulcan. This machine has four motor-driven impeller type agitators mounted on the sides of the tank, allowing agitation to reach into every corner. Inside working area is 72-in. x 36-in., with a depth of 36-in.



Explosion-Proof Lamp

For lighting in flammable atmospheres, such as the interiors of fuel tanks, Crouse-Hinds Co. has introduced an explosion-proof portable hand lamp. It is UL-approved for class I, Group C locations, or Group D usage. Weighing less than 11-lb, the lamp produces a concentrated light pattern.



Owners of International Harvester Diesels—the American Bosch PSB fuel injection pump can now be installed on your engines... *complete kits* available for easy installation... for details, contact nearest American Bosch dealer or write American Bosch, Dept. SSS, Springfield 7, Mass.

the PSB fuel injection pump

UNEXCELLED

... for performance and outstanding service—that's the acknowledged record of more than 100,000 American Bosch PSB pumps now in use.

Here's some reasons why! Simple construction... fewer parts... accurate fuel metering and distribution ... positive governor control ... replaceable hydraulic head for fast field servicing.

What's more—all American Bosch fuel injection products are backed by a growing system of authorized service agencies, fully equipped to provide quick, efficient repair service.

Unequaled value—for top diesel engine performance and economy of operation... long trouble-free life... lower maintenance expense—nothing equals a PSB fuel injection pump.

AMERICAN BOSCH

AMERICAN BOSCH

Division of

American Bosch Arma Corporation

Springfield 7, Mass., U. S. A.

4493

new products

"Trailer That Grows"

This trailer, manufactured of Alcoa aluminum, is large enough to seat 125 men or sleep 40. Sides telescope outwards, as floor folds down accordianwise. Front end carries a generator set which powers lighting and hydraulic expansion system. Looks good for the military, or for contractors working in out-of-the-way places.

Engine Pyrometer

Oregon Industrial Instruments Co. has a pyrometer system with the thermowell permanently installed in the stack. Temperature may be checked with or without test stand. A "well" is installed in each unit, and a quick-connecting coupler connects the "well" to the gage. Only one gage is needed per fleet or installation.

Gas Compressor Modernization

Through the application of compressor cylinders built of nodular iron by Cooper-Bessemer, older type horizontal compressors can now be converted to handle 2000-psi for modern transmission and gas storage service. These compressor cylinders are supplied by C-B for their own type-22 units, and have already been installed in several applications.

Metal Powder Spray Unit

A new metal spray unit for applying hard-facing alloys and other metals in powder form is now available from Wall Colmonoy Corp. It features improved metal flow-rates and increased deposit efficiency with no sacrifice in quality of the deposit. In the process, the powdered alloys are first applied by spraying, and are fusion-bonded by heating with an oxy-acetylene torch.

Air Pollution

In a report given before the Air Pollution Congress, representatives of steel, coal, petroleum and railroads said the fight against air pollution is being won because of improved processes, cleaner fuel, better combustion, wider use of dirt catchers, and increased dieselization. Conference is sponsored by Illinois Institute of Technology.

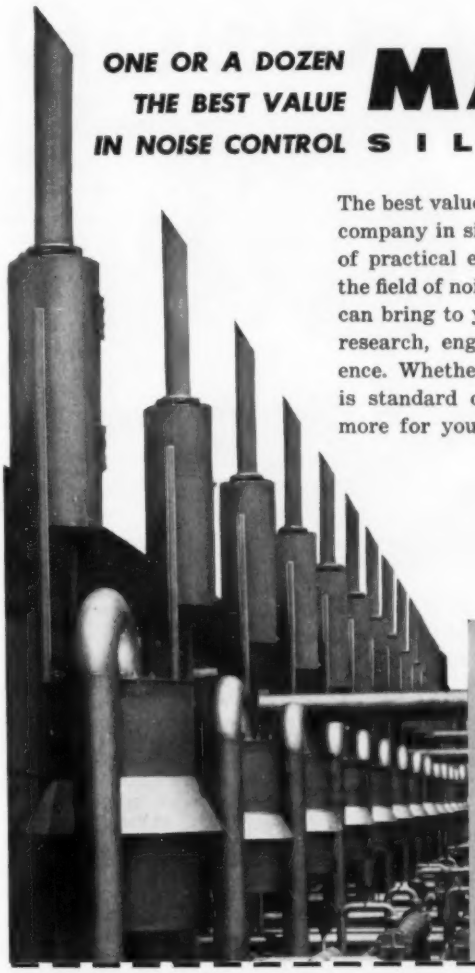
Permanant Mold Iron

Eaton permanant mold gray-iron castings are not simply gray-iron castings made by another technique, but are castings with a combination of properties that are unique.

	SAE #10	Eaton
Tensile Str, psi	20,000 nom	57,000 mean
Hardness BHN	105-120	179-197
Mod of Elas, psi	15,350,000	21,500,000

ONE OR A DOZEN
THE BEST VALUE
IN NOISE CONTROL

MAXIM SILENCERS



The best value because Maxim, the pioneer company in silencing, can point to a store of practical experience second to none in the field of noise control... because Maxim can bring to your problems more years of research, engineering and design experience. Whether your silencing application is standard or "special", Maxim can do more for you.

SILENCERS FOR:

- INTERNAL COMBUSTION AND STEAM ENGINE EXHAUST AND INTAKE
- AIR COMPRESSOR INTAKES AND DISCHARGES
- VACUUM PUMP DISCHARGES
- BLOWER INTAKES AND DISCHARGES
- STEAM, AIR OR GAS DISCHARGES
- JET ENGINE EXHAUST AND INTAKE
- WASTE HEAT RECOVERY

THE MAXIM SILENCER COMPANY
Subsidiary of Emhart Manufacturing Company
93 Homestead Ave., Hartford, Conn.
Gentlemen: Please send bulletins on silencers for:

NAME.....
COMPANY.....
ADDRESS.....

new literature

Fluxes

Flux bulletins 310, 183 and 910 by Accurate Specialties give complete description, application and advantage of either mild-acid flux, non-activated rosin flux, or activated rosin flux.

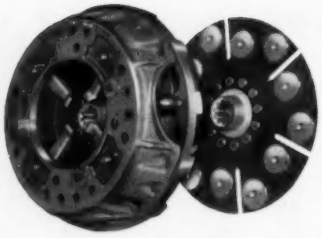
Engineering Case Studies

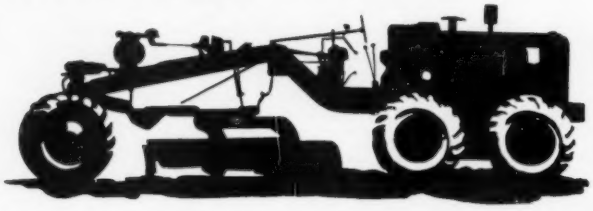
Kaiser Engineering has prepared a booklet outlining approach and procedure in tackling engineering problems. Included are short histories and pictures of projects they have successfully completed.

ROCKFORD

MORE

CLUTCH LIFE
TORQUE CAPACITY
HEAT RESISTANCE





"MORLIFE clutch has gone 851 hours without slipping or adjustment."

"MORLIFE clutch going strong after 1695 hours, working in sand."

"MORLIFE clutches last 950 hours longer, without adjustment."

"MORLIFE clutch needs adjustment once a month, instead of daily."

"MORLIFE requires lighter handle pull and one tenth the adjustments."

"MORLIFE pulls harder and lasts six to ten times longer."

"Won't buy a unit that isn't equipped with Durable MORLIFE clutch."

Designed especially for use in heavy-duty, high-speed engine equipped machines such as trucks, tractors, earth movers, graders, shovels, cranes, dozers and oil field units—

New MORLIFE® CLUTCHES and CLUTCH PLATES Give-

MORE Clutch Life (400% MORE)
MORE Torque Capacity (100% MORE)
MORE Heat Resistance (50% MORE)

See you at the ROAD SHOW CHICAGO Jan. 28-Feb. 2, 1957

See this NEW type MORLIFE clutch at the Road Show in Chicago—or get full information how this clutch improves the operation of heavy-duty, off-highway machines, by writing Department E—

ROCKFORD Clutch Division BORG-WARNER
1301 18th Avenue, Rockford, Illinois, U.S.A.
Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

CLUTCHES

Steel Equipment Manual

A new Reference Manual of Steel Equipment is just off the press from Equipto. Bulletin #485 is 48 pages long, describing all types of steel shelving, work benches, etc.

Generator Control Panel

Kato Engineering Company has published form PAN 1156, illustrating and explaining their floor-mounted, wall-mounted, and generator mounted control panels. Some types of installation are explained, however prices can only be quoted on receipt of specifications.

"Contractors Guide to Better Earnings"

The Export Div. of American Brake Shoe Co. has published a 4-page bulletin for contractors, describing and illustrating manganese steel replacement parts for earth-moving and crushing equipment, including power shovels, bulldozers, portable crushers and asphalt plants.

Dry Powder Reference

Discontinuities in iron and steel castings detectable by the dry-powder magnetic particle method may now be classified by comparison with reference photographs recently published by American Society for Testing Materials as "Tentative Reference Photographs for Magnetic Particle Indications on Ferrous Castings" (E125-56T). Price—$2.50.

Industrial Lighting

A new industrial lighting booklet, "Prescribed Lighting Protects the Eyes of Industry," has been published by Sylvania Electric Prod. The 28-page booklet features sections on safety and visibility factors, standards for use in prescribing plant lighting, uses of flourescent, incandescent and mercury vapor lamps; lighting of other areas, maintenance, and condensed catalog data on fixtures.

new literature

Wayne "Thumbnail" Folder

A three-color folder gives a "thumbnail" description of five new series of internal-gear rotary pumps by Wayne Pump.

Tube-Working Tools Catalog

Tube Fabricating Equipment Catalog #1140 (Parker Appliance) covers their hand tools, with a section on how to use them.

"The Industry Nobody Really Knows"

Gulf Oil Co. is distributing a booklet aimed at giving consumers of all petroleum products a more realistic understanding of how the oil industry actually gets its job done.

Silicone Reference

A two-color 12-page Reference Guide to Silicones has been published by Dow Corning. Almost 150 commercially available silicone products are described briefly and factually, with emphasis on charts, tables and graphs. As in previous issues, products are grouped by usage, enabling engineers to locate a material by what it does as well as what it is.

Arc Welding Reprint

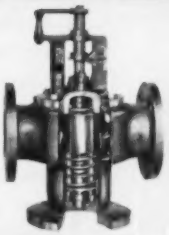
A 12-page reprint entitled "Power Supplies for Gas Shielded Metal Arc Welding" is available from Airco Company International.

Improved Superior Gas Engines

An improved line of model G-825 Superior gas engines, engineered especially for oil field application, has been developed by the White Diesel Engine Div. of the White Motor Company. Bulletin 104 explains features of the 4-cycle, 6 and 8-cyl versions designed to operate at 900-rpm from 200 to 630-hp continuous.

FULTON SYLPHON ENGINE CONTROLS

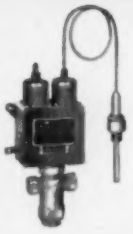
fit the engine and the danger



No. 1280. (No. 1281 similar, but no manual operator)

PREVENTS INEFFICIENT OPERATION
All-in-one control. Holds cooling water or lubricating oil at constant temperature. Unaffected by pressure changes.

Any engine's safer with a Fulton Sylphon safety control or temperature regulator. Because of the wide variety, you can always find the one best for your purpose. And the "heart" of each and every one is the Fulton Sylphon seamless metal bellows—unmatched for accurate, trouble-free performance.

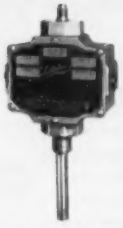


No. 530

STOPS ENGINE
Safety control shuts off fuel if water temperature goes above or lube pressure goes below safe point. Fail-safe.

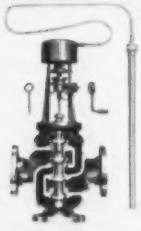
No. 953-E

POSITIVE PROTECTION
Operates in conjunction with No. 530 to stop gas or dual-fuel engines. Shuts off gas supply and vents fuel system.



No. 539

4-WAY SAFETY
If water temperature or lube pressure exceeds limit, No. 539 operates alarm, light or pilot, or stops engine.



No. 923-3WB

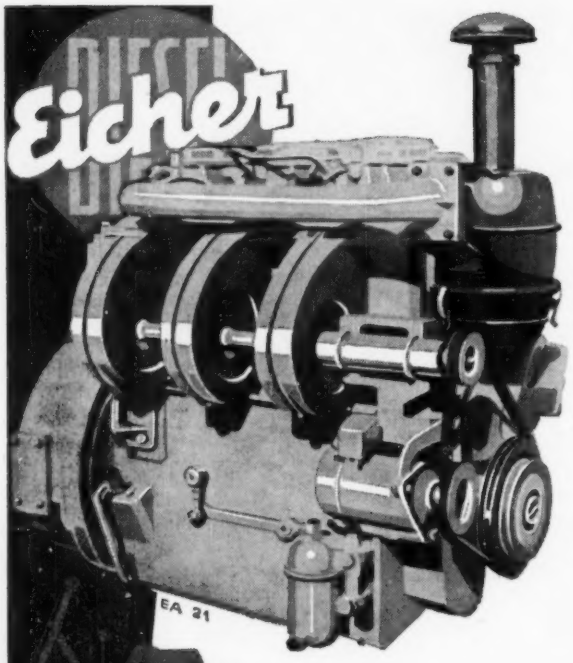
BIG ENGINE CONTROLLER
Holds jacket water or lube oil at desired temperature. Special 3-way valve maintains constant volume of water.

FULL DETAILS GIVEN IN BULLETIN No. 817-ND
Write for your copy

Mr. Controls

Robertshaw-Fulton CONTROLS COMPANY

FULTON SYLPHON DIVISION • Knoxville 1, Tennessee



Air

is the cooling agent— no freezing or other water system troubles!

That is why Eicher has built series of air-cooled Diesel engines since 1947. From subtropical zones to the arctic, they have proven themselves.

All Eicher Diesel Engines have standard cylinders and parts and are built in one, two, and three-cylinder models. Each cylinder has its own air cooling duct to insure uniform flow. Each gets the same amount of air at the same temperature. Cooling is even and expansion, affecting clearances, is the same in all cylinders—a condition necessary for the most efficient operation. Engines are built in 13, 16, 19, 22, 26, 33, 40 and 60 horsepower sizes. Fuel requirements are low, repairs seldom needed, and they have proven their ability to last.

That is why Eicher Diesel Engines are used the world over and are earning praise as long-term performers.

For further information, mail Reader Service Card to DIESEL POWER for forwarding. You will obtain performance data including fuel consumption rates, and illustrated literature. Please give your title and state any special requirements.

Gebr. Eicher, Traktorenfabrik
Forstern/Oberbayern (Germany)

HERMANN

What Do You Know!

(*Answers to Questions on Page 56*)

1. Correct answer is "c". The dual-fuel engines can be started on liquid fuel and then switched to waste sewage gas when it becomes available. Naturally use of this waste product is very economical. See Page 34.

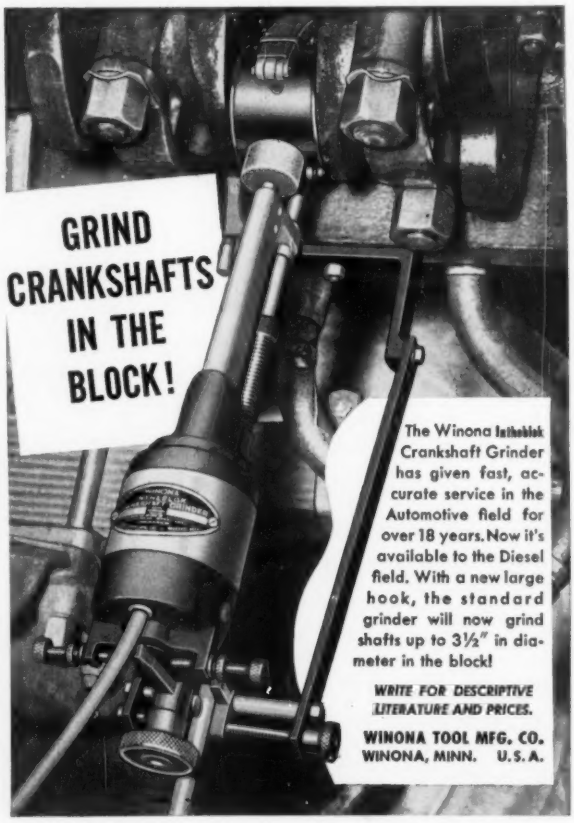
2. Correct answer is "c". By the term "10-in. dredge" is meant the diameter of the discharge pipe on the dredge pump. See article on Page 36.

3. Correct answer is "b". A continuing program of design improvement by manufacturers of small diesels have resulted in improved performance, reduced weight, increased service life, adaptability to broad range of fuels and higher power output. See Page 46.

4. Correct answers are "a, b, and c". It's important that all three of these means be used to keep water from entering or condensing in the fuel system and removing any that is in there. See article on Page 50.

5. Correct answer is "b". By elimination of the center oil groove in a bearing it's projected area is increased without changing bearing dimensions and oil film thickness is increased at same time. See Page 52.

6. Correct answer is "b". A properly designed delivery valve can control injection characteristics such as injection pressure, period, cutoff, etc. See Page 52.


GRIND CRANKSHAFTS IN THE BLOCK!
The Winona Isthelok Crankshaft Grinder has given fast, accurate service in the Automotive field for over 18 years. Now it's available to the Diesel field. With a new large hook, the standard grinder will now grind shafts up to 3½" in diameter in the block!
WRITE FOR DESCRIPTIVE LITERATURE AND PRICES.
WINONA TOOL MFG. CO.
WINONA, MINN. U.S.A.

new literature

Temperature Conversion Chart
Moeller Instrument Co is offering its temperature conversion chart to engineers, students, and others having use for this pocket-size aid.

Controlled Air Nozzle
Literature is available describing an air nozzle that allows an operator complete control of the air gun. He can direct the air flow from a slight puff to a full blast without jumps in air pressure. Made by Mortimore Mfg. Co.

Fuel Oil Treatment
The Perolin Co. has published a booklet outlining how better maintenance saves the engine. Technical bulletin DOA on Diesel Fuel Oil Treatment outlines how Perolin may be used.

Packless Valve
A complete line of packless valves for applications involving hazardous liquids and gases is described in a 22-page bulletin published by Fulton-Sylphon Division of Robertshaw-Fulton Controls.

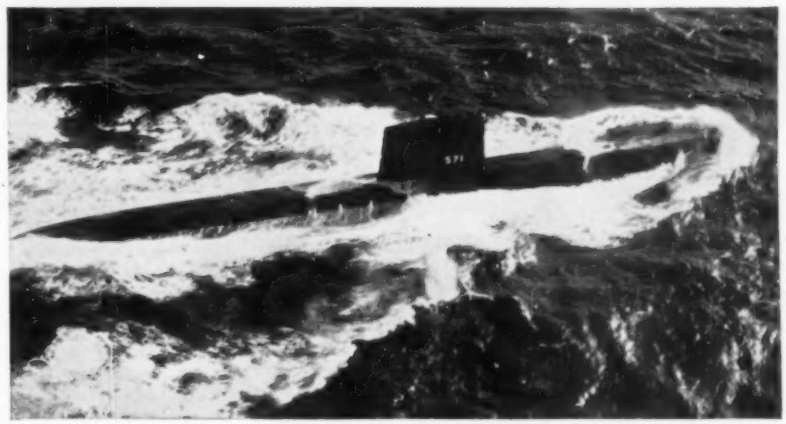
"Offshore" Cranes
"Lorain" 'offshore' cranes are described in an 8-page folder published by Thew Shovel Co. Profusely illustrated, the folder describes the various models suitable for mobile drilling platforms, tenders, barges, and permanent platforms for handling mud, materials pipe, personnel, and sea-going supplies of all kinds.

"Cold Welding"
A 16-mm sound movie and 10-minute documentary account of maintenance welding at Thule Air Force Base, Greenland, has been produced by Eutectic Welding Alloys Corp. The film depicts diesel cylinder wall repair and other heavy equipment welds. Film is available on a free-loan basis to schools, technical societies, etc.

Guide to Spring Design
Fundamentals of spring design, presented in easy-to-grasp form and in sufficient detail to guide the product designer through the initial stages of a spring design problem, are set forth in a new 8-page brochure "Spring Design and Selection—in Brief", published by Associated Spring Corp.

Motor Carrier Study
A comprehensive study of the financial status of the motor carrier industry, made by an executive of the First National Bank of Boston, is now available in booklet form from the ATA. Title: "Financial and Crédit Aspects of the Motor Carrier Industry."

For over 42,000 nautical miles . . .



DETROIT CONTROLS
guarded both men and machinery aboard the Nautilus

Never before has a submarine chalked up such a performance record. And never before has Detroit Controls had such an important part to play in protecting lives and equipment.

Used as key controls on the Nautilus' air conditioning and refrigeration systems, Detroit Controls are also used on her alarm systems to warn of overheating or low lube oil pressure.

For nearly 30 years Detroit Controls have supplied pressure and temperature controls for naval and marine vessels. These specifically designed controls limit, regulate or guard pumps, diesel engines, heating and air conditioning systems, lube oil temperature and pressure alarms, desuperheaters, clutches and other marine installations.

For complete information write for Catalog 100-F.

5900 Trumbull Avenue
Detroit 8, Michigan

DETROIT CONTROLS
CORPORATION
Division of AMERICAN-Standard

Canadian Representatives: RAILWAY AND ENGINEERING SPECIALTIES LTD., Montreal, Toronto, Winnipeg

organizational news

Maxim Names Field Mgr.

The Maxim Silencer Co. announced the appointment of Lee J. Doyle as Manager of Field Engineering. Mr. Doyle will work on industrial and aircraft silencing.

Lee J. Doyle

W A. Thomas

A. F. Murphy

EMD Promotes

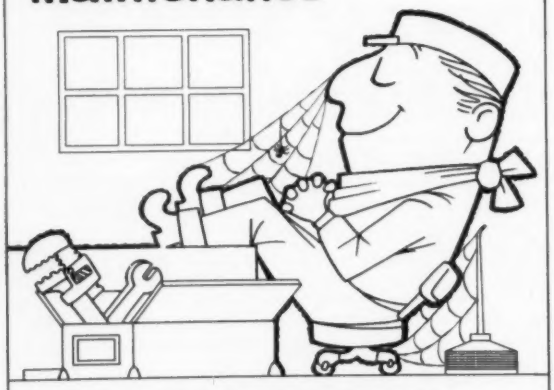
Warren A. Thomas has been promoted to District Sales Manager, Chicago region, by Electromotive Division of G. M. Formerly Rebuild Sales Manager, his old spot is being filled by Austin F. Murphy.

MM Retail Sales Mgr.

George E. Dodson has been appointed Manager of the newly-organized Retail Sales Dept. of Minneapolis-Moline. This new department is a step in the direction of "coming-out-fighting". It is expected to spark sales by efforts applied at the dealer-level.

G. E. Dodson

Very little maintenance



ENTERPRISE

-the engine with built-in quality!

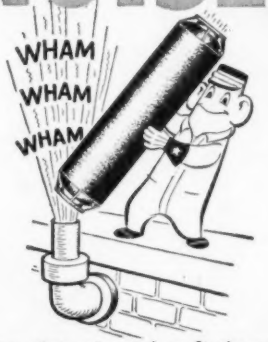
ENTERPRISE ENGINE & MACHINERY CO.
18th and Florida Sts., San Francisco 10
Sales and Service in Principal Cities

STOP THAT NOISE!

from Air, Steam and other gas discharges

with

BURGESS-MANNING SNUBBERS



Stop that noise and profit through better neighbor and employee relations. Avoid compensation claims.

Burgess-Manning Snubbers are engineered to effectively correct your specific noise problem.

From a WHAM

BURGESS-MANNING COMPANY
Sound Engineering 751 EAST PARK AVENUE, LIBERTYVILLE, ILL.
DALLAS, TEXAS

met the

PETTER DIESEL

family yet?

In the rugged PETTER diesel family are aircooled and water-cooled models all the way from 1½ hp (the toughest baby yet) to 48 hp. And long, faithful service is an old Petter family tradition; witness the more than 400,000 Petters in use throughout the world.

The Petter motto is "*ubique*" (we get around). You'll find Petters driving well pumps in the Persian Gulf, irrigation systems in India, marine auxiliaries in Louisiana, standby generators in Connecticut. There isn't a piece of powered equipment in its range for which a Petter can't do a better, dieselized job . . . cut running costs and fire risk.

For rugged power in junior sizes, check the Petter range today! Write for information—a few choice dealerships are still open.

PETTER DIESEL ENGINES

Petter

Division of **BRUSH ABOE INC.**
60-07 39th Ave., Woodside, L. I., N.Y.
Branch office: 3507 Stillman St., Jacksonville 7, Fla.

KIENE® DIESEL

PRESSURE INDICATOR

gives compression and firing pressures faster

SIMPLE
RELIABLE
COMPACT

Send for Bulletin K-100

The Model K-100 Kiene Pressure Indicator accurately measures compression and firing pressures — assures the proper maintenance of diesel engines — helps prevent costly down time. Only one moving part — no friction or inertia effects — no complicated adjustments.

KIENE DIESEL ACCESSORIES, INC.
10352 PACIFIC AVE., FRANKLIN PARK, ILLINOIS

organizational news

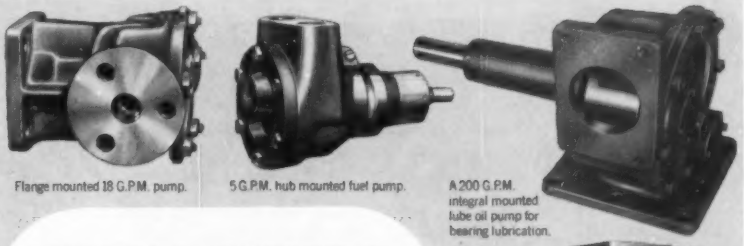
Cleveland Diesel Appoints

Cleveland Diesel Engine Division of General Motors announced the appointment of Jack F. Spaulding as Purchasing Agent at Cleveland Diesel.

J. F. Spaulding

P&H Distributor

Rental Service Company (Philadelphia) has been named distributor for a three-state area for the Diesel Engine Division, Harnischfeger Corp.


Flange mounted 18 G.P.M. pump.
5 G.P.M. hub mounted fuel pump.
A 200 G.P.M. integral mounted lube oil pump for bearing lubrication.
A 90 G.P.M. flange mounted pump with valve on head.
A 10 G.P.M. opposite port oil pump built to specifications.

VIKING PUMPS
to Your Specifications

Viking lube oil, fuel oil and coolant pumps, built to fit your equipment, are a specialty of Viking.

Shown here are only a few of many special pumps, ranging in size from 5, 10, 18, 90 to 200 gallon per minute. Smaller and larger pumps also available. Send today for folder 57Sd.

VIKING PUMP COMPANY
Cedar Falls, Iowa, U.S.A. In Canada, it's "***ROTO-KING***" pumps
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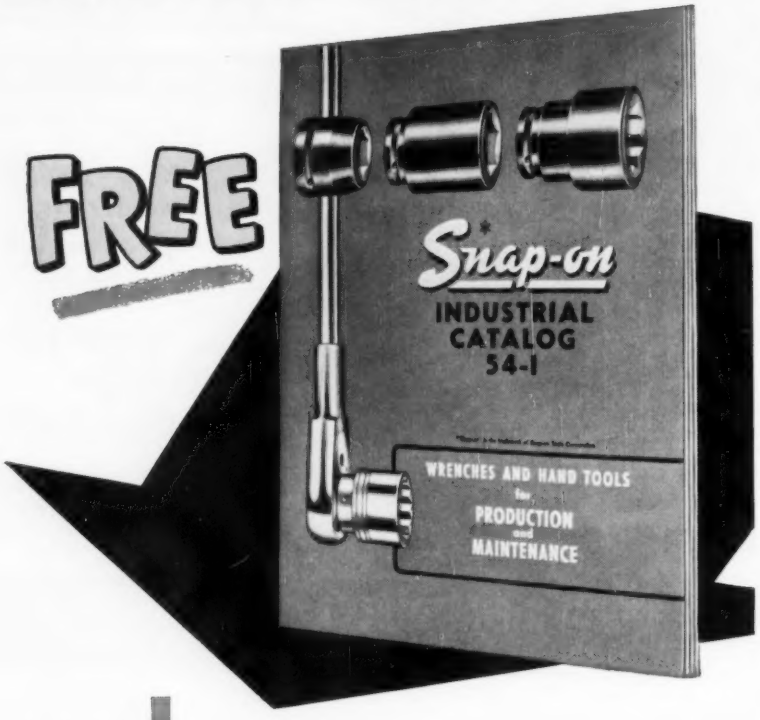

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organizational news

Socony Elects

Arthur V. Danner, Vice-President and Director of Mobil Overseas Oil Co., has been elected president to succeed Paul V. Keyser, Jr., who will continue as a member of the Mobil Overseas Board.

Director of Porter

Fred C. Foy, president of Koppers Co., inc. has been elected to the Board of Directors of H. K. Porter Co., inc.

ASME President

William F. Ryan, Vice-President, Director, and Senior Consulting Engineer of Stone & Webster Engineering Corp., was installed as President of the American Society of Mechanical Engineers.

Birthday Party

The Garrett Corporation's AiResearch Industrial Division celebrated its second anniversary. Garrett specializes in turbochargers for diesels, and related products.

Texaco Appoints

E. F. Koenig has been appointed Technical Representative of the Technical Services Division of the Texas Company's Research and Technical Department. He will specialize in the field of additives for petroleum lubricants.

Texaco Regional Mgr.

R. J. Ronan has been appointed Regional Manager—Technical Services, Research and Technical Dept. Mr. Ronan is in charge of technical services for industries in 14 Eastern and Middle Atlantic States.

Mack Appoints

Jack Rosenquest has been appointed National Used Truck Manager by Mack Trucks, inc. Mr. Rosenquest will be in charge of all phases of development and operation of Mack's used-truck merchandizing program.

organizational news

Automatic Switch Distrib.
Good Supply & Equipment Co., of Akron, has been appointed distributor of Asco solenoid valves, Automatic Switch Co.

Leece-Neville Names
Richard G. Priest has been named Field Manager of the Cleveland Region by the Leece-Neville Co.

Johnson Bronze Names
Charles A. Williams has been appointed Vice-President—Sales, of the Johnson Bronze Co.

Also, from Amer. Air Filter
After 33-years in the air filter business, John R. McConnell retired as Vice-President of American Air Filter Co., inc. "Mr. Mac" literally grew up with the company, and is responsible for many of AAF's advances and successes in the sales and advertising field.

Nicad Appoints
Andreas J. Darlson has been appointed Eastern District Manager by Nickel Cadmium Battery Corp. He will cover the Eastern States from New York.

Also, Melville E. Ingalls (former Eastern Mgr.) has been appointed Special Representative for sales to railroads.

In Memorium
Robert M. Reindollar, immediate past-president of the American Road Builder's Association, died in Baltimore after an illness of several months. Widely known for his long-held aggressive views favoring a National Highway Program, Mr. Reindollar was one of the first to advocate a $50 billion road-building program in appearances before the Clay Committee at the White House, various committees of Congress, and numerous audiences throughout the country.

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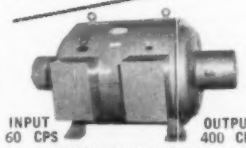

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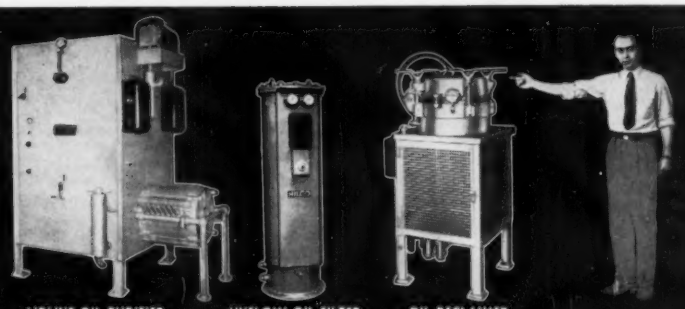

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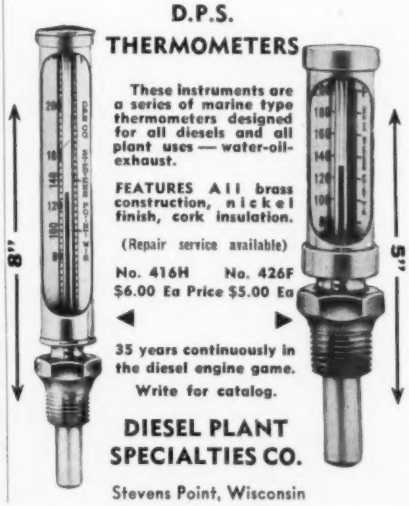

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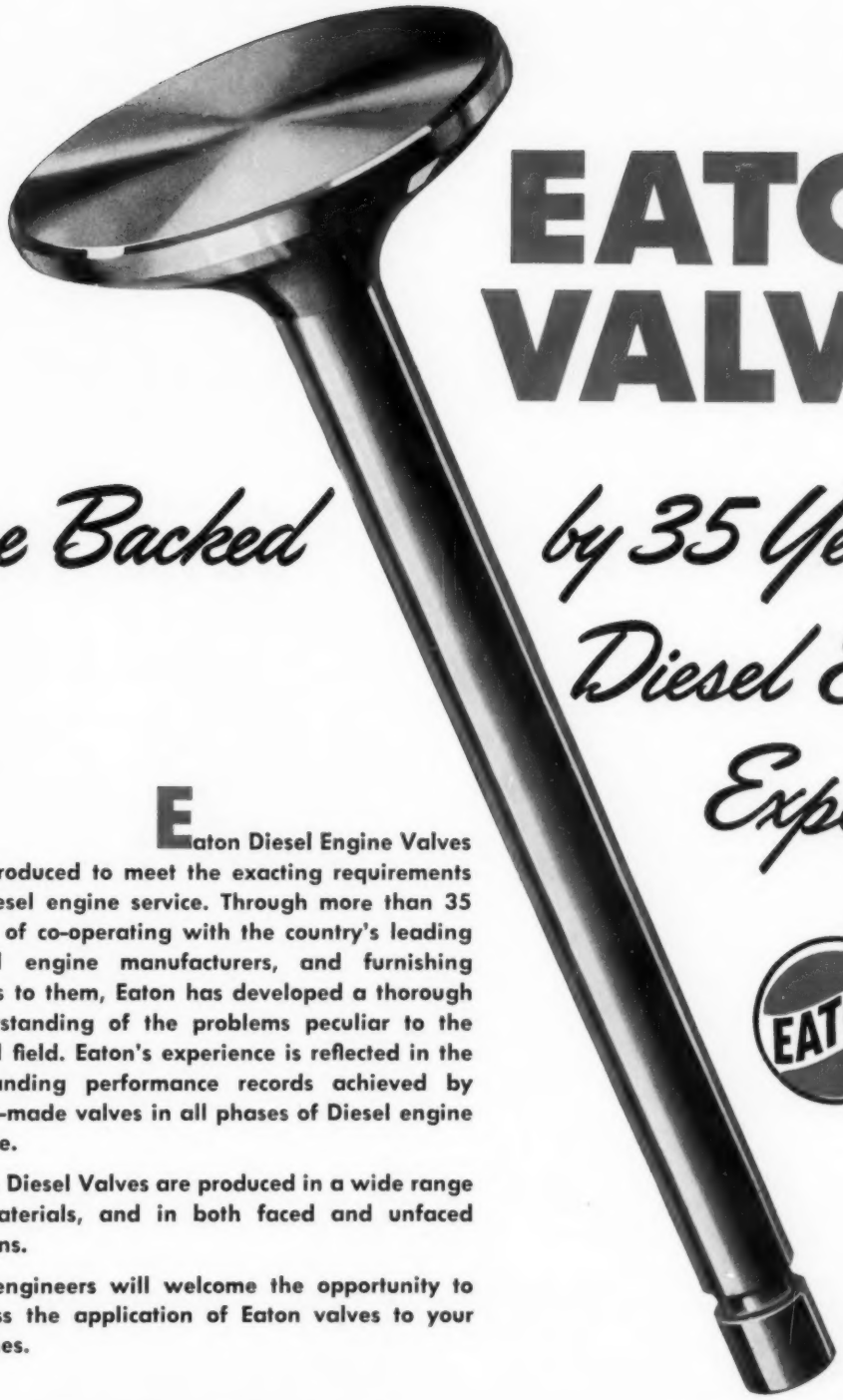

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Eaton Diesel Valves are produced in a wide range of materials, and in both faced and unfaced designs.

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How Aitkin Light Plant came to choose STANODIESEL Oil M

Case story of exceptional results obtained with Standard Oil diesel lubricants

Because of plant operating conditions and generator capacity installed, Aitkin, Minnesota, Municipal Light and Power Plant had to operate a 1,235 H.P. Worthington engine over 38,000 hours before it could be taken out of service for complete overhaul. During that time, 19.2 million K.W.H. were generated. STANDARD HD Oil, predecessor to STANODIESEL Oil M was the lubricant.

When the engine was overhauled, all pistons were in good condition. All rings were free to move in ring grooves. There were no scars on cylinder liners. Piston walls were bright, wear was even. Based on this performance from STANDARD HD, plant management converted to the improved new oil—STANODIESEL Oil M—at the time of overhaul. STANODIESEL Oil M has been giving top performance ever since.

STANODIESEL Oil M is made from highest quality base stock. Additives help the oil resist viscosity change and keep parts clean. Other additives control foam, keep highly stressed parts lubricated.

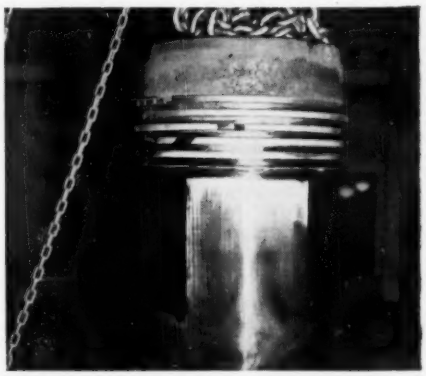
Get more information about STANODIESEL Oil M from your Standard Oil industrial lubrication specialist. There is one near you in any of the 15 Midwest and Rocky Mountain states. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

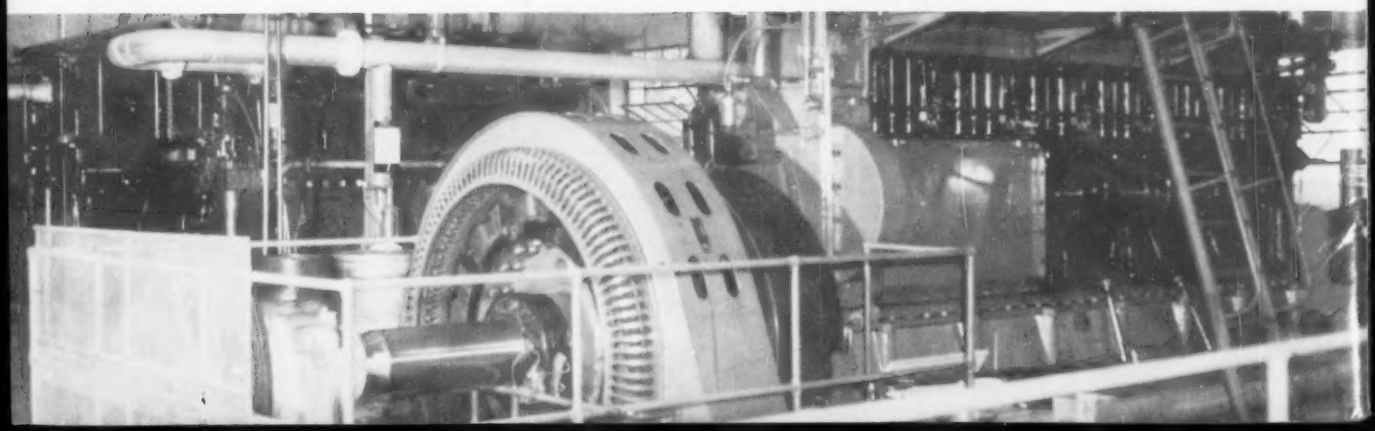
STANDARD OIL COMPANY
(Indiana)

STANDARD

John Acklestad, Aitkin plant superintendent, and Carl Klenner (left) Standard Oil industrial lubrication specialist check engine service record. Carl has been rendering technical service on lubrication problems at Standard Oil for eight years. He has a degree from the Michigan College of Mining and Technology and has completed the Standard Oil Sales Engineering School.

"As is" photo of piston removed from engine after 38,000 hours of service. Rings were free.



Quick facts about
STANODIESEL Oil M

- Keeps crankcase, pistons, cylinder walls clean.
- Combats deposit and wear problems imposed by use of economy fuels.
- Maintains film on difficult to lubricate areas and parts.
- Eliminates spark plug fouling in spark ignited gas engines and reduces combustion chamber ash and deposits in engines burning natural gas, LPG and liquid fuels.
- Eliminates fuel injector and pump sticking caused by deposits on injector barrel and plunger where fuel and lube oil commingle.